AUTOMOTIVE INDUSTRIES

SEPTEMBER 15, 1953

AUTOMOTIVE and AVIATION MANUFACTURING

ENGINEERING . PRODUCTION . MANAGEMENT

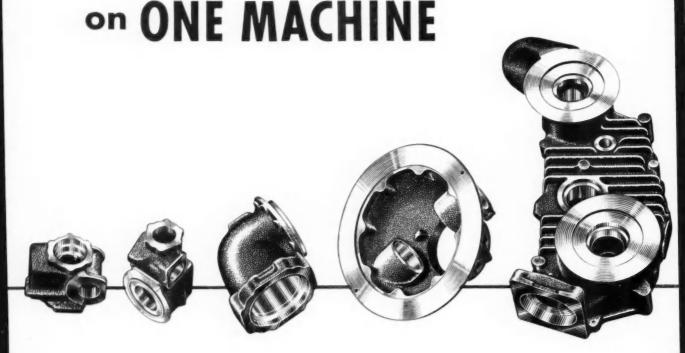
In This Issue... The Challenge of Plastics · · · New Combustion Data

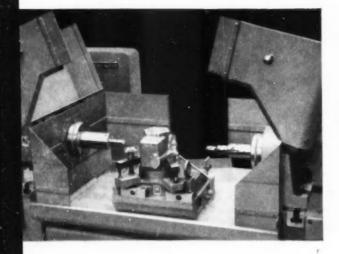
· · · European Military-Civilian Vehicle Design · · ·

COMPLETE TABLE OF

Cutting Fluid Handling · · · Aircraft Templet Camera
· · · Landing Gear Strut Welding · · · Italian Styling

How to raise a family of five





• On long-run production jobs, the speed, precision and economy of Heald Borizing has become almost a tradition. But what about short-run work on a variety of parts? Here, too, the versatile Heald Bore-Matic can give you faster, better production, at lower cost per part!

Here's a typical example. The Model 322 Bore-Matic shown at the left finishes FIVE different jet engine parts — each with a different fixture and tooling setup. Interchangeable fixtures are platen or angle plate type, as required. In some cases, adapters are used to permit one fixture to accommodate more than one part. Aligning rails help to locate the different fixtures quickly and easily. Both roughing or semifinishing and finishing are done with maximum speed and economy on this one Heald machine.

Long Runs or Short — when it comes to precision finishing, it pays to come Heald.

Internal and Rotary Surface Grinding Machines and Bore-Matics



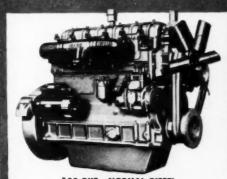
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WAUKESHA

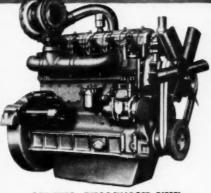
Diesel-135 Series - Gasoline



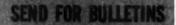
135-DKB-NORMAL DIESEL 426 cu. in. Max. hp 147 @ 2800 rpm.



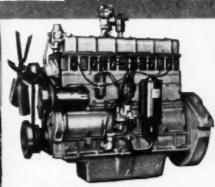
FAST SMOOTH POWERFUL



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135-GKB and 135-GZB—GASOLINE 426 and 451 cu. in. Max. hp 147 and 153 @ 2800 rpm

214

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS. . NEW YORK . TULSA . LOS ANGELES

AUTOMOTIVE INDUSTRIES, September 15, 1953

1



Mattison Grinder beats old time (15 hours) by 12 hours

The picture above shows a punch and die grinding operation on a Mattison High-Powered Precision Surface Grinder at Lyon Metal Products, Incorporated. Previous time on a converted planer-grinder was 15 hours — now with a Mattison Grinder equipped with special fixture, grinding time has been reduced to 3 hours.

Mattison Grinders are proving profitable investments in plants where "time out" for reconditioning is a vital factor in meeting production schedules. Surfaces are reconditioned and edges sharpened in a minimum of time, eliminating costly delays and holdup of production. Many manufacturers installing the Mattison Grinder for reconditioning dies find many other uses for it in grinding flat surfaces where accuracy and fine finish are required. For complete information on the Mattison High-Powered Precision Surface Grinder, send for free copy of our latest circular.



MACHINE WORKS

ROCKFORD - ILLINOIS

AUTOMOTIVE INDUSTRI

SEPTEMBER 15, 1953

VOL. 109. NO. 6

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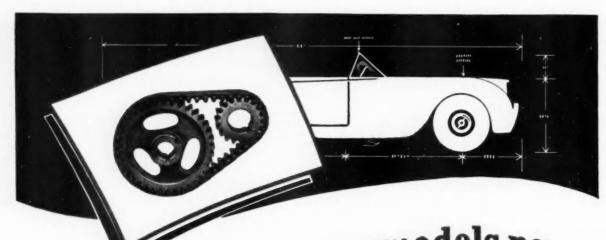


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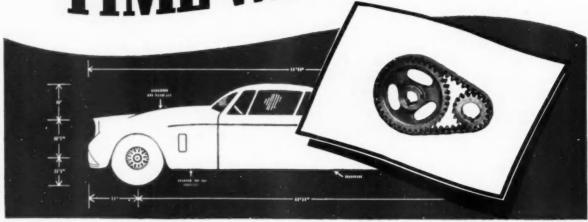
Audit Bureau of Circulations

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly). October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918. EDITORIAL EXECUTIVE OFFICES, Chestnut and 56th Sts., Philadelphia 39, Ps., U. S. A. Cable address-Autoland, Philadelphia.

AUTOMOTIVE INDUSTRIES. Published semi-monthly by Chilton Co., Chestnut & 56th Stz., Phila 39. Entered as Second Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.; Under the act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: United States, Mesice, Cuited States, Possessions, and all Lattin-American countries, 1 year \$2.00, 2 years \$3.00, 2 years \$3.00, 2 years \$3.00, 2 years \$3.00, 2 years \$4.00, 2 years \$4.00

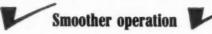


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OR greater design flexibility plus superior performance, leading automotive manufacturers are swinging to timing chain. Let our engineers show you how this outstanding chain can fit into your latest engine. Engineering and specification details are available in Book 2065.

Segmental bushings provide automatic joint snugness Segmental bushings are made with slight bow.



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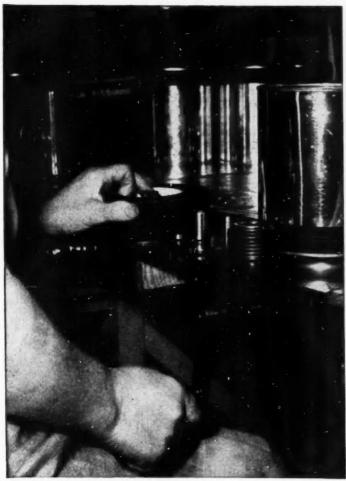
Bow in bushing acts to keep a snug joint.

TIMING CHAIN and SPROCKETS

LINK-BELT COMPANY: 220 South Belmont Ave., Indianapolis 6, Ind. Offices in principal cities.

AUTOMOTIVE INDUSTRIES, September 15, 1953

Tape helps Bendix can small aircraft parts



Polyken Tape No. 214 seals the lids on "canned" aircraft parts at these taping tables. Even the largest cans are sealed in approximately eight seconds.

Field mechanics at U. S. Navy and Air Force bases used to receive small repair parts packed together in cardboard cartons. This method did not provide perfect protection during shipping and left the unused parts exposed to damaging moisture and grit after the cartons were opened.

Bendix solved this problem by "canning" the parts in special tin containers—and sealing the lids with reusable Polyken Tape No. 214.

This Polyken Tape provides a strong, weatherproof seal that conforms to government specifications JAN-P-127, Type 1 Grade B. And because Polyken Tape No. 214 has excellent adhesion and tack, the same piece of tape that makes the original seal can be used again by merely pressing it back around the lid.

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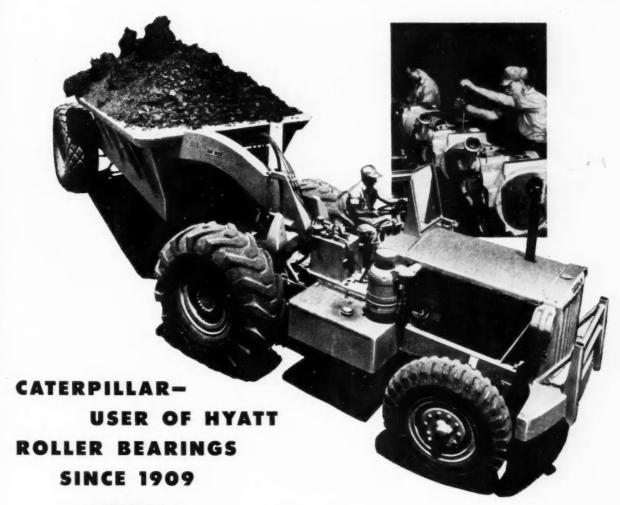
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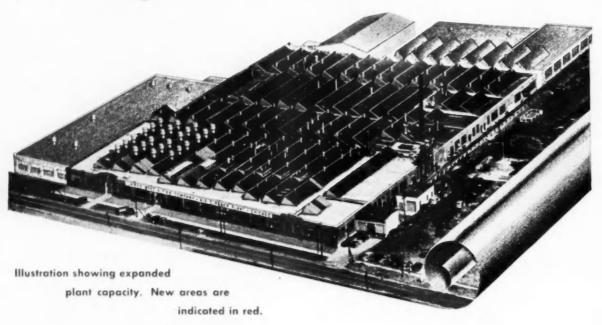
You don't take chances when you're building earth moving equipment. If your rig doesn't have the stamina to stay on the job, the contractors don't want it! And that's why Hyatt Roller Bearings have been used on Caterpillar-built tractors since 1909.

Caterpillar uses Hyatts at vital load-carrying positions—transmission, final drive gear and pinions—and their superior performance has helped to build a world-wide reputation for the big yellow machines. Manufactured from select steels and subjected to the highest standards of quality control, Hyatts last longer under the heaviest loads—with a minimum of maintenance. They're built to be forgotten.

In the automotive field, Caterpillar's experience has been duplicated many times—for Hyatt is one of the leading suppliers of roller bearings for passenger cars, trucks and busses. If you're not already profiting through the use of Hyatts, ask for the services of a Hyatt Sales-Engineer. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

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Whatever your air cleaner requirements, United Specialties Company has the engineering experi-

ence — and the production facilities — to handle them. We invite your inquiry.



United Specialties combination oil bath air cleaner and precleaner.



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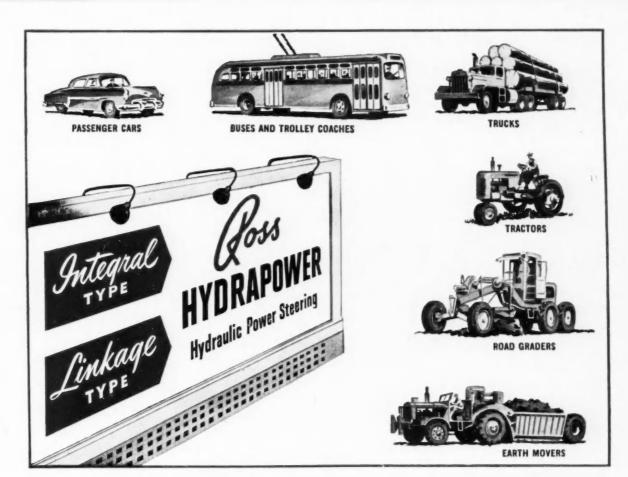
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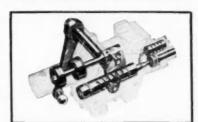
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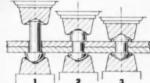
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These modern production tools, widely used in the highly competitive automotive industry to reduce costs and improve production, greatly simplify and speed up riveting. What's more, by riveting cold with this "silent squeeze" method, operators get a better, stronger riveted joint, every time. Hannifin "Hy-Power" portable and stationary yoke riveters are available in capacities from 71/2 tons to 100 tons (more in multiple). Powered by the exclusive, patented "Hy-Power Hydraulic Generator, their quiet, automatic cycle is started with a

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That this is an established fact and not a theory is unmistakably proven by the ever increasing percent of car buyers specifying the Bendix Low Pedal Power Brake on cars offering it as optional equipment... tangible evidence that the Bendix Low Pedal Power Brake is one of the most popular devices offered the public in years.

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High Spots of This Issue

* Special Handling of Cutting Fluids and Machine Lubricants

The passage of time has witnessed numerous operating improvements at the military plant of Continental Motors Corp., Muskegon, Mich. A new system for handling cutting fluids and machine tool lubricants is highlighted. Page 32.

* European Civilian, Military Vehicles Lack Coordination

Almost as distant a chimera as a United States of Europe, coordination between European civilian and military vehicle design is almost non-existent. The author analyzes the situation and notes the little progress that is being made. Page 36.

Landing Gear Struts Preheated Before Arc Welding

The production of landing gear struts for Fairchild "Flying Boxcars" is an exacting process to which painstaking care is given at Willys Motors, Inc. This article describes the steps in making these vital aircraft components. See Page 40.

★ The Challenge of Plastics

Among the prime benefactors of miraculous plastics are the automotive and aviation industries. Reviewed in this survey are the many applications they have found and the advances to be expected from new materials and techniques. Page 42.

★ Commercial Vehicle Industry in Austria Has Slow Growth

Although no longer a passenger car producer, Austria is exerting herself to build up a vigorous, albeit small, commercial vehicle industry. The production picture is studied here, along with several typical trucks and buses. See Page 56.

★ 47 New Product Items And Other High Spots, Such As:

New data on combustion in automotive engines; what the French want in a car; novel Italian styling; special camera expedites aircraft projects; and automation at Ford.

Automotive and Aviation News, Page 17 Complete Table of Contents, Page 3

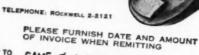
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Zews of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 109, No. 6

September 15, 1953

Registrations for 1953 Estimated Up 2.7 Per Cent

Motor-vehicle registrations in the U. S. are continuing to climb and are expected to reach 54,700,000 for 1953, according to an estimate of the Bureau of Public Roads of the U. S. Dept. of Commerce.

Passenger cars will number 45,035,000, a 2.8 per cent increase over 1952, while trucks and buses are expected to total 9,674,000, a 2.4 per cent rise. California, with 5,405,000 registrations, will lead all other States by more than a million vehicles. The second ranking State, New York, for the first time will pass the four million mark.

The largest gains are taking place in the 11 Western States with increases ranging from 6.3 to 1.8 per cent, and averaging 4.3. Next in line are the 16 Southern States and the District of Columbia with an average increase of 2.6 per cent. The 9 Northeastern States rank third with a 2.4 per cent rise, and lastly the 12 North Central States with an average gain of 2.2 per cent.

For all States and the District of Columbia, the increase over 1952 is 2.7 per cent. Over two-thirds of the Western States, one-half of the Southern States, one-third of the Northeastern States, and one of the 12 North Central States (Michigan) are above the national average increase in registrations.

Sales Drive Is Keynote of Industry Planning

Whether or not the automobile industry is "entitled to a larger share of the consumer dollar, it is going after its share with a will this Fall.

Automobile salesmen are fast becoming the VIP's of the industry. By October Ford dealers in the north-



"CAR OF THE FUTURE"

The new Hudson Italia has a silhouette nearly ten in. lower than standard Hudson models. The closed coupe on a 105-in. wheelbase is powered by a 114-hp Jet engine, though designed to handle the Hornet engine as well. Its body was designed and produced in Milan, Italy, by Carrosseria Touring in collaboration with Hudson engineers and designers. Air scoops set into the fenders cool front and rear brakes. With only a few modifications, Hudson says it will easily become a family car.

eastern states will have more than twice the number of salesmen they employed just a year ago. Financial reward for retail automobile and truck salesmen is increasing, according to a Ford sales manager, with many reporting commission earnings of \$7,500 to \$12,000 a year.

Continuing heavy demand for consumer credit has prompted General Motors Acceptance Corp. to announce it soon will borrow \$150 million by selling debentures, to be paid off in 1961. GMAC borrowed \$77 million in August and says it may have to seek more cash later to meet customer requirements. As a result of the new-planned borrowing, GMAC's long-term debt reportedly will be raised to about \$963.5 million.

A Philadelphia Ford dealer last month laid claim to the world's record for new-car sales from stock in a single day, Ogontz Motors Co. sold 110 passenger cars and six trucks Aug. 20 as over 1000 people came in before midnight. Only sales for immediate delivery — cars driven from the showroom floor or allowing up to 48 hours for titling, licensing and dealer preparation—were included in the total. Seventy-five new owners took their purchases home without any delay.

Strike Time Down

Lost time by reason of strikes during first half 1953 was only 40 per cent of the amount lost during the same six months last year, the U. S. Labor Dept. reports. In number, strikes were almost as numerous as last year but involved neither as many workers nor extended periods of time.

Strikes involved six or more workers through June 30 totaled 2675, involved 1.3 million workers, and resulted in 12.6 million days of lost time. Last year, 32.7 million mandays were lost.

Trus of the AUTOMOTIVE

Automotive Wage Rates Rise Cent an Hour

Production costs for automotive companies took another slight jump this month with hourly wages going up one cent an hour under cost-ofliving labor agreements. The industry narrowly missed a two cent increase with only 1/10 of a percentage point more required to make the extra one cent an hour mandatory. The increase was based on the July 15 BLS index which stood at 114.7, a record high. Since 19 cents of the cost of living allowance was transferred into the permanent base rate when contracts were revised last spring, the allowance now stands at six cents an hour. Corresponding increases are granted to salaried employes by most manufacturers.

Replacement Parts Sales to Hit Peak This Year

It now looks very much as though 1953 will be the biggest year in history for the automotive replacement parts business. Sales already are up considerably over the same preiod a year ago, with one of the larger parts wholesaling organizations reporting an increase of 24 per cent. Normally, the last four or five months of the year are especially good months so the total for 1953 should be far ahead of the previous high point established in 1951. Wholesalers also report that they are getting more requests for credit extension from dealers, many of whom want to be carried for 30 days or so.

V-8 Engine Plant Planned for Cleveland

Plans for a new V-8 engine plant which Ford Motor Co. will build adjacent to its present engine plant and foundry near Cleveland were announced recently.

The plant is expected to be operation early in 1955, employing approximately 3000 people plus 1000 additional at the present foundry. The present Ford engine plant and foundry at Cleveland currently employ 4200.

Newly acquired land adds 146 acres for a total of 346 acres. Ford



FIRST FOR 1954

This Hudson Hornet typifies the Flight Line Styling for the first of the 1954 cars. Entire line of engines features a new induction system giving higher horsepower output, to 150 in the Hornet standard and 170 with Twin H-Power.

will have almost three million sq ft of manufacturing space in its Cleveland engine and foundry facilities after the new plant is completed, adding 562,000 sq ft.

The new plant will not replace any existing facilities. The present Cleveland engine plant has been producing Ford six-cyl engines since September, 1951. It now is being equipped to produce Mercury V-8 engines beginning later this year.

Detroit Harvester Buys Moto-Mower Co.

Detroit Harvester Co. has acquired Moto-Mower Co., also of Detroit, through a cash purchase of all 50,000 shares of outstanding stock. Detroit Harvester acquires a 100,000 sq ft manufacturing plant at Richmond, Ind., in the deal. The company manufactures 12 models of reel and rotary power mowers. Present executives and production personnel of Moto-Mower will be retained and the company will be operated as a subsidiary.

Cadilac, Nash Resume Production

Cadillac Motor Car Div. resumed automobile production Sept. 8, just 27 days after the disastrous Detroit Transmission Div. fire. It began equipping cars with the Dynaflow transmission, to continue until the emergency plant at Willow Run is in production on the Hydra-Matic.

Oldsmobile has begun to use the Dynaflow as well, for the past two weeks on a part-time basis.

After a complete shutdown since July 2, Nash body and assembly plants at Milwaukee and Kenosha, Wis., reopened this week. About 7500 employes returned to work, out of 18,000 at work before layoffs began May 18.

Reduction of inventories was given as the reason for the extended closing. Production was cut initially because of the shortage of overdrive transmissions, which normally were supplied on 40 per cent of production.

Another stretchout in Chrysler production was indicated by the change to a single shift last month. Some 2200 employes were laid off, for the second cutback this summer. A shortage of parts was caused by the 40-day strike at tool and die shops.

Packard output was stopped last week and this also for lack of tooling for 1954 models. About 6500 of 15,000 workers were affected. Briggs laid off 1700 as a result.

Studebaker cut production by onethird last weekend, laying off about 5.000.

Production after the Labor Day weekend was off even more than the previous week, when the heat, shortages, and changeovers cut output by 10 per cent from the week before.

AND AVIATION INDUSTRIES

White to Move Autocar Division

Construction will start soon at Exton, Pa., on new manufacturing facilities for the recently-acquired Autocar Div. of White Motor Co. Cost of the one-story, 142,500 sq ft plant and office, to replace Autocar's present plant at Ardmore, Pa., will total more than \$2 million. The new construction on a 55-acre site is expected to be ready for occupancy by April, 1954.

White president R. F. Black announced that Edward F. Coogan, president of Autocar since 1949, is to be named vice-president in charge of the Autocar Div. C. R. C. Custer continues as treasurer, B B. Bachman will continue as head of engineering and development, and A. Gelpke will continue in charge of production.

The announcement said Autocar's 1250 employees would be increased if possible. About 50 per cent of the plant machinery and equipment will be new. It is expected that some operations, such as engine manufacturing, will be discontinued, and others will be consolidated with White operations.

The Ardmore property of 13.7 acres will be disposed of as soon as the new facilities are ready.

Standard Steel Spring Timken-Detroit Merge

Stockholders of both Timken-Detroit Axle Co. and Standard Steel Spring have approved merger of the two firms by overwhelming majorities at separate stockholder meetings. The new firm will be called Rockwell Spring & Axle Co. More than 83 per cent of Timken-Detroit's outstanding stock shares were represented with 98.2 per cent voting for the consolidation. Standard Steel Spring stockholders voted 99.2 per cent in favor of the move with 80.2 per cent of the outstanding stock voted. The merger will become effective Sept. 30. Capitalization will consist of a new issue of 4,562,722 shares of \$5 par common stock. Shareholders of the two companies will receive one share of the new stock in exchange for each share presently held.



FORD X-100 NOW ELECTRICIAN'S DREAM

First conceived as a styling model, the Ford X-100, designed and built at Dearborn, is now a test car. The 221-in. convertible weighs 5900 lb. The high-compression engine runs at low speeds on half of a four-barrel carburetor, at medium speeds on two more venturis, and at high speed full throttle on 12 venturis, for 300 hp. Front brakes are blower cooled, four windshield wipers overlap, hand brake is electrically assisted, sixway powered leather seat is warmed, and gears are electrically selected, wheels have electric jacks. The 12-volt system of 24 motors, 44 tubes, 50 bulbs, 92 switches, 29 solenoids, 53 relays and 23 circuit breakers requires built-in charger.

Railroad Rights-of-Way Proposed for Highways

A Ford executive has made an interesting road building proposal to the National PAR Committee. George J. Crimmens, director of dealer relations and business management, suggests that the committee seek the cooperation of railroads for building expressways over existing railroad rights-of-way. He contends that fantastic cost of new highway construction might be greatly reduced by building elevated expressways over existing railway tracks or surface expressways on rights-of-way adjacent to existing tracks or in place of tracks moved underground.

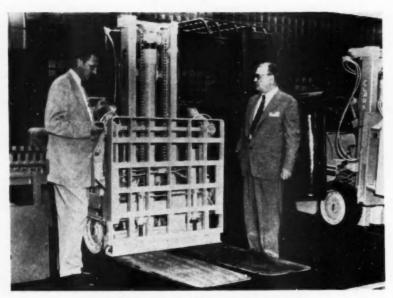
Crimmens pointed out that railroads already have excellent existing routes fanning out from metropolitan centers to residential sections and that use of such rights-of-way would eliminate costly condemnation and destruction of property and excavation and relocation of sewers and other public utilities. He recommended a thorough study of his proposal; including relative cost of construction, maintenance, and technical and legal problems. Among other suggestions for railroad participation in solving traffic problems, he proposed that railroads operating nonprofitable routes be permitted to reroute these lines and make the rightsof-way available for expressway construction.

Ordnance Designs New Anti-Tank Vehicle

Information has leaked out that Ordnance Tank Automotive Center has developed a new lightweight, high speed tank destroyer. Secrecy has been so tight that even the project number could not be mentioned. Officially it now has been christened "Ontos" which is the Greek equivalent for "The Thing."

Several models of the new combat vehicle have been built with more than a dozen already under test. Basic concept is a track-type unit mounted on an extremely light chassis powered by a regular truck engine and carrying light armor. It could be produced on an assembly line basis at reasonable cost and would therefore be considered much more expendable than more expensive and heavier tanks. Armament can vary from one to six 105 mm recoilless guns to give concentrated broadside power fire against enemy tanks. The unit also would be highly maneuverable for carrying out hit-and-run attacks. At present there are no plans for production and no indication that the Army field forces have selected any one of the several models as the type best suited for their needs.

Mews of the AUTOMOTIVE



FIFTY YEARS OF MATERIALS HANDLING

Clark Equipment Co. president George Spatta, right, and W. E. Schirmer, vice-president, Industrial Truck Div., examine a tork lift truck equipped with Pul-pac attachment which eliminates pallets. The firm on the occasion of its fiftieth birthday held a display and parade at Buchanan, Mich.

Clark Celebrates Golden Anniversary

Clark Equipment Company, a leading manufacturer of industrial materials-handling trucks and automotive components used in the production of trucks, buses, farm tractors and construction equipment, is observing its 50th year of operations.

Founded by the late Eugene B. Clark, the company has had a sustained growth from the beginning. Record highs for sales and earnings were established during the past year (1952), when earnings of \$5,504,000 were realized on sales of \$131.8 million. The company's net worth has grown to more than \$41 million.

At Buchanan the company produces axle housings and axles, materials handling equipment, as well as operating a steel foundry. Battle Creek is the home of the industrial truck division which makes fork-lift trucks, industrial towing tractors, and Tructractor models. In 1950 the company placed in operation a new plant in Jackson, Mich., equipped for the manufacture of Clark transmissions for

trucks and buses, drive units for farm tractors and heavy agricultural machinery, and gears and mating parts for use in other Clark products. At Benton Harbor, Clark builds Ross straddle carriers.

The Clark story begins in 1903 with the exploitation of Celfor drills, boring bars, sockets, and reamers. In 1911 a new company was organized to make steel castings, one of the early products being a cast steel disc wheel for motor trucks. The foundry boasted an electric steel furnace, said to be one of the first in America at the time. During World War I Clark built materials-handling trucks for its own use, and went into production soon after. The first Clark platform lift came in 1922, followed in 1928 by the fork-lift. Transmission manufacture began in 1927.

One of the best known Clark products is the one-piece forged steel housing for truck and bus axles. Manufacture was begun in 1929. Today the plant has a capacity of many thousands of housings per month. Lift truck production has passed 150,000.

Ordnance Cuts Off Bids on Maintenance Items

The Ordnance Tank Automotive Center at Detroit has suspended bidding on millions of dollars worth of automotive replacement parts pending clarification of defense needs under the new cutback policy. Parts affected are expendable items such as tires, batteries, tank tracks, and other parts for which needs are much smaller during peace time than in actual war.

Studebaker Plans Plant in Texas

Studebaker is planning to build an assembly plant in the Dallas-Fort Worth area of Texas sometime next year. Defense contracts and other plant problems will delay start of construction until then, according to H. S. Vance, president. Actually no property has yet been acquired for the plant.

Thompson Products to Run Jet Plant

Thompson Products, Inc., of Cleveland will operate a jet engine test plant for the Navy under a new contract. The \$1.286 million plant will be built east of Cleveland on Lake Erie on a 94-acre site. It will be a naval industrial reserve aircraft plant.

Service Schools Set

Chrysler Div. is setting up a permanent service training school at its McDougall plant in Detroit. Objective is to bring in key men from the field organization and from major dealers for instruction on service, particularly on new developments such as air conditioning. These men will carry the information back to the field to instruct service mechanics.

General Motors opened the first of its 35 service training schools early this month at Detroit. GM is about half way through its job of acquiring sites and plans to have the entire 35 schools in operation within the next year. Ford also is planning to open its technical service laboratory at the Ford Div. headquarters near Detroit.

AND AVIATION INDUSTRIES

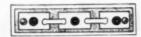
Willys Hints Automatic Drive Close for Aero

Willys Motors has hinted in an offhand manner that it was close to adoption of Hydra-Matic drives on the Aero Willys car shortly before the GM plant at Livonia burned. Willys gave as one reason for eliminating its second shift late last month "a fire in another major supplier plant." The reference could be only to the Hydra-Matic plant fire indicating that plans for adopting the automatic drive were well advanced.

Other reasons listed for the curtailed production were a seasonal balancing of inventories and a major supplier (Borg-Warner) strike during May and June. As a result of eliminating the second shift, daily production will be reduced to about 480 vehicles from 520. During the first seven months this year Willys produced approximately 80,000 vehicles compared with 92,252 during the same period a year ago.

Massey-Harris Merges with Harry Ferguson

Massey-Harris Co., Ltd., and Harry Ferguson companies have merged under the name of Massey-Harris-Ferguson, Ltd. The consolidated company will operate five plants in the U. S., four in Canada, and also plants in England, Scotland, South Africa,



6-VOLT



12-VOLT

BATTERY

Relative number of parts in six and 12-volt batteries was pointed out by L. E. Wells, Exide chief engineer, at the SAE summer session. Additional cost of added lead for 12-volt unit was not shown.

	NUMBER OF PARTS			
ITEM	6-VOLT	12-VOLT		
PLATES	51	66		
STRAPS	6	12		
SEPARATORS	48	60		
CONTAINER	1(3-COMP.)	1(6_COMP.)		
COVERS	3	6		
CONNECTORS	2	5		
VENT PLUGS	3	6		

France, and Germany. The Ferguson name will continue to be carried on the tractors and implements of Ferguson design.

Massey-Harris is a Canadian company incorporated in 1891 to consolidate two other companies dating back to 1847. Under the merger agreement all shares of the operating Ferguson companies are to be transferred to Massey-Harris with Ferguson shareholders to receive in exchange slightly

more than 1.8 million shares of newly issued Massey-Harris stock. Harry Ferguson will be chairman of the new firm and John S. Duncan, currently president of Massey-Harris, will serve as president.

GM, Ford Assembly Restricted in India

The trend to increasing reliance on native skills and materials, and reduction in dollar purchases, is shown in the recent action by the Indian Government in restricting assembly of U. S. or other foreign vehicles.

The plan affects plants assembling knocked-down General Motors and Ford products, since these are controlled by U. S. and Canadian owners respectively. Five native companies, including Hindustan Motors, associated with Studebaker, and Premier Automobiles, working with Chrysler, are expected to reduce imports of parts 50 per cent by 1956. Other assembly plants are to reduce operations to nothing in next three years.

Expanded markets by 25 per cent is another aim of the Indian Government. To this end import duties were reduced in June from about 62 per cent to 40 per cent, for three years.



PISTON PIN MAKER IS FIFTY

Burgess-Norton Mfg. Co., Geneva, Ill., piston pin maker, celebrated its 50th anniversary recently by entertaining major suppliers. Shown left to right are Harry R. Barrett of Youngstown Sheet & Tube Co.; O. S. Spark at Ohio Crankshaft Co.; Dayton Eckstrom of the Eckstrom Co.; S. A. Seckler, R. J. Gillen, and A. R. Jones of Republic Steel Corp.; A. P. Martella of B-N; H. H. Gotberg of Colonial Broach Co.; and R. P. Broadhurst of Youngstown Sheet & Tube Co.

Trews of the AUTOMOTIVE

FAST FORMING

Heliarc-welded jet fuel tank blanks are stretchformed without preforming in two minutes on this battery of hydraulic machines at Pashfushin Aviation
Corp. Rubber punch is
expanded against steel
die contoured to size
with tool plastic.



Kaiser Motors Spurns Bid for Plane Job

Kaiser Motors definitely will not bid for a new contract to build C-123 cargo planes for the Air Force. With General Motors occupying the space vacated when Kaiser lost its aircraft contract, any possibility of another bid to regain the contract is precluded. In fact, Kaiser management has informed union representatives that it definitely will not bid on the C-123 job. Kaiser recently purchased for Willys Motors complete ownership of Chase Aircraft Co., designers of the C-123.

The firm reveals that General Motors has leased approximately 1.6 million sq ft at the Willow Run plant, an area somewhat larger than that used by Kaiser for aircraft production. Criginally it had been stated that GM leased 1.5 million sq ft. Kaiser also specifically denied reports that General Motors had discussed buying the Willow Run plant. General Motors space will occupy approximately ½ of the plant's manufacturing area.

B-R is 100

The Baker-Raulang Co. pioneer in the materials handling industry, celebrates its 100th anniversary this year, including several mergers.

Baker had its beginning in 1853 when German immigrant Jacob Rauch opened his one-man wagon repair shop on Cleveland's West Side. In 1902 another firm, the Baker Motor Vehicle Co., built an electric drive shaft automobile. At Long Island in 1902, Walter C. Baker drove his electric Torpedo to a 104-mph speed record.

The first closed-body auto made in America was produced by Rauch & Lang in 1905. In 1910, Baker built the first electric road truck, of the type still used in New York City.

The no-shift Owen Magnetic was introduced in 1915, when the two firms merged. The new firm left the passenger car field during World War I.

Industry's first ram truck, a cantilever type self-loader with mast and carriage for lifting loads mechanically, was produced by Baker in 1922, followed in 1924 by a mobile electric crane which was first used for assembly and repair of locomotives.

An articulated fork truck, which steered by a pivoted frame, was introduced in 1936 for narrow-aisle work in warehouses and close-quarter carloading iobs. First hydraulic lift for a high-lift platform truck was produced by Baker-Raulang in 1942.

Ford Plans Industrial Relations Building

The fifth unit to be built at the Ford Research and Engineering Center will be an engineering staff industrial relations building. Scheduled to be started this fall, it will provide 45,000 sq ft of floor space for Ford engineering staff employes' services. Ford also is planning a propulsion test facility at the Center to be associated with the new scientific laboratory there. It will contain cells for development of "high speed and high temperature devices," gas turbines.

L-M Manufacturing Head Joins Packard as V.P.

Just as Ford drew executives from other large companies during its postwar reorganization, Packard now is also following the same course. Its latest executive to be brought in from outside is Ray B. Powers, formerly general manufacturing manager of Lincoln-Mercury, who has been named vice-president. He will succeed George C. Reifel, who retired at the end of August after 40 years with Packard. Powers will assume charge of all manufacturing operations. He joined Lincoln-Mercury in 1949 following many years in the industry as a manufacturing executive.

Modern CA&E Quarters

Continental Aviation & Engineering Corp., subsidiary of Continental Motors Corp., will soon start construction of two new buildings adding some 50,000 so ft to its existing facilities at Algonquin and Kercheval Aves.. Detroit.

One of the buildings, an air conditioned two-story structure of contemporary design, will be set above a 60-car parking space and lobby reception center, and will provide 30,000 sq ft. Executive offices, conference rooms, sales and general offices will occupy the lower of the two floors, and engineering and drafting rooms the upper. The second building, of two stories, will be of modern steel-framed construction with glass and aluminum wall panels. Construction will be completed in 1953 at a cost of about \$750,000.

AND AVIATION INDUSTRIES

GM Pays \$18 Million for Euclid Stock

Further details on the acquisition of Euclid Road Machinery Co. by General Motors show that the purchase price was about \$18 million. About 100 stockholders have formally agreed to exchange 16,510 shares of preferred and 37,580 Class A shares for 305,137 shares of GM common stock. Current management will continue under the new ownership. It is reported that while Euclid has been eminently successful it lacked the capital reserves to expand up to the company's potential.

General Motors acquires a 225,000 sq ft plant completed in 1951 at a cost of more than \$6 million. Production there is on a volume basis with trucks and tractors built on a 220 ft assembly line. Euclid claims to sell in from 70 to 75 per cent of the world markets for its large earthmoving equipment with about 60 per cent of its sales represented by repeat business. In addition to the four plants operated in the Cleveland area, the company also has a plant in Glasgow. Scotland. Its sales outlets include 75 distributors in the United States and Canada and 73 distributors in foreign countries.

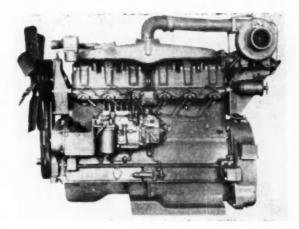
Clevite Research Center

Clevite Corp. of Cleveland is planning to build a \$5 million Research Center at Euclid, O. The project will include 13 buildings and will consolidate, at one site, several research and development laboratories which the company now has scattered throughout Cleveland. Most of the buildings will be modern one-story structures similar to school buildings and will be used primarily for research in electronics, cound detecting equipment, magnetic recording, and rubber bushings and bearings.

LPG for I-H

The motor truck division of International Harvester Co. has placed in production five medium-duty models in the R-160 series with liquefied petroleum gas fuel systems.

The new series of LPG-powered models ranges in gross vehicle weight



CHARGED

A turbo - supercharged version of the Harcu-les six-cyl DFXE Diesel is now in production. The 895 cu in. engine develops 318 hp at 2000 rpm and 846 lb ft of torque at 1800 rpm. Stripped weight is 3000 lb. It is designed for stationary

from 14,000 to 17,000 lb. Engine is the 108-hp, valve-in-head International Silver Diamond 240. Compression ratio of 8.4 to 1 plus added horsepower and torque characteristics may be obtained in the SD-240 with LPG fuel system through installation of special pistons.

New Cat Pusher

A D8 pusher tractor has been announced by Caterpillar Tractor Co. Caterpillar's DI3000 engine has been modified to produce 150 drawbar hp at 1200 rpm. Weight is increased to 50,025 lb, and the tractor features a new transmission and oil-type clutches.

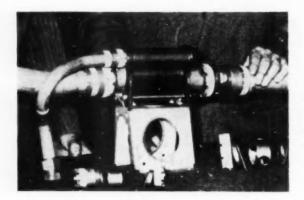
The addition of the oil-type flywheel clutch as standard equipment on the D7 track-type tractor has been announced. This makes four of the company's track-type machines which now have this new clutch. It was made standard equipment on the D8 and D6 track-type tractors and the No. 6 shovel earlier this year.

1953 U. S. PASSENGER CAR PRODUCTION

(As reported by the car factories)

				Eight Months	
	August 1953	July 1953	August 1952	1953	1952
Chrysler	6,304	13.533	5,583	121,101	77.587
De Soto	8,697	12,107	4.527	94.777	59 104
Dodge	13,976	21,458	11.497	217.677	152,314
Plymouth	46,332	69.797	21,294	457.261	280,456
Total - Chrysler Group		116,895	42.901	890,816	569,461
Ford.		124,899	47,404	753.260	434 767
Lincoln.	2,511	4.407	2.133	34,859	20.854
Mercury	35,309	35,966	13,489	196.554	111,61
Total-Ford Group	161,475	185,272	63,026	984,683	567,240
Buick	48.356	45.678	20.140	371.189	202 76
Cadillac.	4.812	11,000	9.367	78.663	84.00
Chevrolet	136.564	139.459	42.316	1.050.285	528.20
Oldsmobile	24,390	36.628	14.228	257.790	142.69
Pontíac	31,868	42,199	17,026	304,507	171 .85
Total - G. M. Group	245,990	274,964	103,077	2,062,434	1,107.52
Henry J-Kaiser	None	242	5.754	19.804	44.69
Willys.	4,082	5,664	3,236	34,612	31,02
Total-Kaiser Group	4.082	5,906	9,020	64,416	75,72
Hudeon .	3,834	3,553	5,986	57,536	54.23
Nash	None	1,056	6.903	107,343	79.26
Packard	4.457	7,173	2.825	71,551	38,46
Studebaker	22,159	21,958	4,634	141,242	96.75
Total - All Makes	517,306	596.777	238,372	4,370,021	2,588,66

Mews of the AUTOMOTIVE AND AVIATION INDUSTRIES



BETTER

This leakproof jet fuelline coupling was developed by Lockheed engineers. It is said to eliminate shrinking or swelling under wide pressure and tempereture variations. Flexible unit is one-fifth the weight of farmer types, is made of Dural or stainless.

Willys Buys Chase

Chase Aircraft Co. is now a whollyowned subsidiary of Willys Motors, Inc., with the purchase for \$1,690,000 from Michael Stroukoff of his 51 per cent interest in the company. The initial 49 per cent stock interest was acquired from Henry J. Kaiser Co. at the time of the purchase of Willys-Overland assets by Kaiser Manufacturing Corp. and the change of that company's name to Willys Motors, Inc., on April 28.

In connection with this announcement Clay P. Bedford, president of Chase, said that Chase will continue in business at its present location at West Trenton, N. J. New officers of Chase are William A. Cannon, vice-president and treasurer, and H. E. Ryker, vice-president and general manager of the West Trenton Div., and Herman C. Wieben, Jr., chief engineer.

Mr. Stroukoff has formed a new company, Stroukoff Aircraft Corp., which has an option to purchase some of the properties of Chase and to take over leases and other properties, it was announced. These transfers are subject to approval by other interested parties, including the Air Force.

Lockhood Buys Parts

Lockheed Aircraft Corp. announced the first major sub-contracts for production of the new C-130 turbo-propeller military transport, to be built for the Air Force by Lockheed's Georgia Div. at Marietta. The Crosley Div., Avco Mfg. Corp., Nashville, Tenn., will build complete tail assemblies. The Nashville plant is currently furnishing similar units for the Boeing-designed B-47 Stratojet, which also is being built by Lockheed at Marietta and Douglas at Tulsa. Rohr Aircraft Corp. of Chula Vista and Riverside, Calif., will manufacture the turbo-prop engine power packages.

New Fastener Plant

Dunn Steel Div. of Townsend Co. will start construction of a new plant at the firm's Plymouth, Mich., head-quarters. The half-million dollar project will increase the division's capacity to produce special cold-headed fasteners for the automotive industries. Included in the project is a contract for a one-story building with 41,000 sq ft of floor space. It is expected to be completed by Jan. 1, 1954.

Steel Name Change

Jones & Laughlin Steel Corp. has announced that its high-tensile low-alloy steels, known as "Otiscoloy," henceforth will go by the trade name of "Jalten." The name-change conforms to the pattern of other Jones & Laughlin trade names. These include "Jalloy," an alloy steel resistant to abrasion, which is much used, for example, in mine and quarry chutes, and "Jalcase," a case-hardening, cold-finished steel used to make products like engine gears and roller bearings.

Jeep to be Made in Japan

Official approval by the Japanese Government of the first agreement ever signed for the manufacture of American motor vehicles in Japan was announced this month. The agreement is with Mitsubishi Heavy Industries Reorganized, Ltd., one of Japan's largest manufacturing concerns. A plant at Nagoya, 175 miles southeast of Tokyo, with over three million sq ft of space will be used.

The new agreement provides for progressive manufacture. Mitsubishi will rapidly develop the manufacture of its own parts to Willys' specification and is expected to reach 100 per cent Japanese material content in the near future. Assembly of Henry J passenger cars has been going on for some time in Japan.

Titanium Strip, Coated Aluminum Offered

Commercially pure titanium, precision-rolled in strip up to eight in. wide and down to .0005 in. thick, to tolerances as close as ±.0001 in., for use in the manufacture of aviation components, is now readily available from the Industrial Div., American Silver Co., Inc., 36-07 Prince St., Flushing 54, N. Y.

A new process for the hard-coating of aluminum, now in use by Anodic, Inc., Bridgeport, Conn., makes possible the application of this light-weight, readily-available metal to many types of equipment and parts. The hardened surface, generally 0.002 in. thick, which approximates case-hardened steel or chromium plating, has a very high resistance to abrasion and corrosion, a high dielectric strength, and a low coefficient of friction. In tests still in progress, hard-coated aluminum parts formed from the same dies used for similar steel parts, have outworn their steel equivalents 3.5 million to one million cycles and have not yet shown signs of fatigue. The firm uses the Alcoa MHC process.

Continued on Page 80

Men in the News

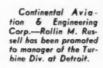




Studebaker Corp. — Clarence H. Smith, formerly head of the aircraft engine plant, is now assistant general superintendent of all South Bend plants.



Chevrolet Motor Div.—B. D. Marshall former manager of defense plants, is now manager of Detroit and Buffalo plants. M. W. Clark is manager of the new Flint engine plant. A. R. Roskilly, plant manager of the Tonawanda, N. Y., aviation engine plant, also heads the new forge and foundry plants there. Charles A. McKenny, below right, is named manager of the new Livonia spring and bumper plant.









Lipe-Rollaway Corp.

—Robert S. Root is now chief engineer, clutch division.





Dadge Div.—John E. Brennen was named to the executive staff, while continuing as general manager of the Chrysler jet engine plant.





Firestane Tire & Rubber Co. — W. E. Lyon was named director at tire engineeFing recently.

New Departure Div.—Harry W. Holdsworth became advertising manager recently, succeeding C. B. Beckwith who retired. George A. Krepps is now director of inspection.



Reynolds Metals Co.

—R. Carter Dye was appointed manager, automotive market.



Standard Pressed Steel Co.—Raymond N. Gruber has been named director of marketing. Charles J. Betz succeeds him as sales manager of the Unbrako line.

(Turn to page 133, please)

Necrology

Frank I. Lamb, 55, president of Triplex Corp. of America, died at Pueblo, Col., on Aug. 8.

Louis M. Ki.nedinst, 70, former vice-president of sales for Timken Roller Bearing Co., died Aug. 10 at Canton, O.

Tazio Nuvolari, 61, former European racing driver for Alfa Romeo, died at Mantoue, Italy, on Aug. 11.

Lawrence B. Rivard, 67, retired chief of body engineering for Lincoln Div., died Aug. 10 at Dearborn, Mich.

Ellwood C. Howell, 48, advertising and sales promotion manager for the Carboloy Dept., died on Aug. 13, at Grayling, Mich.

Donald H. Montgomery, 57, vice-president and director of the New Britain Machine Tool Co., died at his home in Farmington, Conn., on Aug. 13.

Magnus M. Burgess, 56, presdent of Sheller Mfg. Corp. and a director of E. W. Bliss Co., died Aug. 14 at Arbor, Mich.

Alfred H. Helwing, 79, pioneer inventor of automobile spark plugs and fuel pumps, died Aug. 16 at Anchorville, Mich.

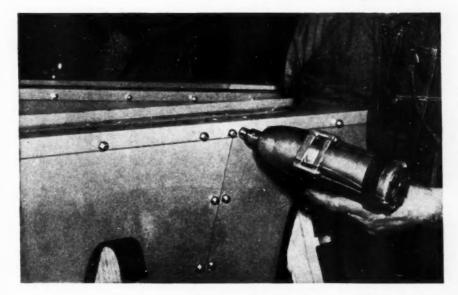
George A. Brockway, 90, founder and chairman of the Brockway Motor Co., died at Cortland, N. Y., on Aug. 17.

A. Albert Klein, 61, assistant director of research and development at Norton Co., died at Worchester, Mass., on Aug. 25.

Otis L. Waller, 60, retired general sales manager of the Buick Motor Div., died at Chicago, Ill., on Aug. 28.

all ndustry revolves around (10) SOURCES WALLACE BARNES ..WILLIAM for Mechanical D.GIBSON RAYMOND COMPANY **Springs** BARNES-Manufacturing COMPANY BRISTO CONNECTICUT GIBSOH -COMPANY 1800 CLYBOURN AVE. CHICAGO 14, B.G.R RAYMOND COOK PENNSYLVANIA F. H. MAHROSS AND SONS CO.
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CONNECTICUT 10300 PLYMOUTH RD. PLANT PLYMOUTH, MICH. OHIO DIVISION ANN ARBOR DUNBAR DAYTON, OHIO BROTHERS MILWAUKEE COMPANY **DIVISIONS OF** DIVISION SEABOARD ASSOCIATED SPRING CORPORATION IN CANADA - The WALLACE BARNES CO., Ltd., Ho AL E. ERIE ST. Coil Spring Div. 35 E. WASHINGTON BLVD. LOS ANGELES 15.

To cut assembly time

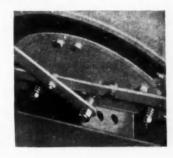


The one-piece, self-locking ELASTIC STOP nut is installed in seconds with an electric torque wrench. It will lock in any desired position on a bolt or stud—without extra parts or extra operations. Integral locking collars of nylon or fiber permit multiple re-use and re-setting.



and maintain adjustments

This Master Control mechanism on the Century Seeder must maintain a precise adjustment under conditions of severe vibration, in order to give a uniform seeding rate. ELASTIC STOP nuts maintain this accurate adjustment in spite of vibration, impact or stress reversal.



Century Engineering Corporation uses





H. H. McLeland, Chief Engineer for the Farm Equipment Division of the Century Engineering Corporation says:

"We specified Elastic Stop nuts on our new Century Seeder for all critical points because they withstood hundreds of hours of testing without losing their adjustment under vibration. They did not damage the bolt or stud threads, and could be re-set many times.

"We specified the same nuts for noncritical points because they facilitated rapid assembly with an electric torque wrench, and eliminated a lock washer. These features saved many hours of assembly time per day."





ELASTIC STOP NUT COEPORATION
OF AMERICA

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Dept. N43-95, Elastic Stop No 2330 Yauxhall Road, Union, I		
Please send the following free f	astening information:	
☐ Elastic Stop nut bulletin ☐ Pointers on how to use them	Here is a drawing of our produc What fastener would you suggest	
Name	Title	
Firm		
Street		
City	Zone State	

Here's a short cut to selecting wet clutch facings



When you're looking for a facing material for a new wet clutch design, it would save time and experimental expense if you could safely confine field tests to only a few likely materials. A practical means of taking such a short cut is one of the results of the basic research on clutch facing materials now being done in Armstrong's Research and Development Center.

The key to this laboratory work is the Armstrongbuilt test equipment shown at left. This unit is helping to get answers to a lot of basic questions. For example, what is the effect of varied operating temperatures on a given organic friction material? Or the effects of changing speed, pressure, oil, or variations in compound formulations?

The answers to such questions are being developed under standard, controlled conditions. This information allows Armstrong to guide you more directly toward the one material that will do the best job in your particular clutch design.

Unfortunately, there's still no way to predict the effect of varying mechanical designs on facing performance. This means, of course, that your initial tests must be run on materials chosen on an educated guess basis.

Often, however, you'll find that one of these first Armstrong materials will meet your torque and engagement requirements. If not, then a comparison of your field test results with our laboratory data on the same compounds will indicate which other Armstrong's material you should test or point to the modifications needed to fit a standard compound to your needs. This controlled method of facing selection obviously can save you both time and expense.

If you're working on a wet clutch now or would like to improve the performance of an existing unit, write for a copy of our "Clutch Facing Data Sheet." We'll be glad to study the data you submit, suggest suitable materials, and supply samples for your experimental use. Armstrong Cork Company, Industrial Div., 7209 Imperial Ave., Lancaster, Pa.

ARMSTRONG'S FRICTION MATERIALS

Thompson increases facilities

to better serve the automotive industry

In order to keep pace with demands for improved chassis and steering parts, including the new, revolutionary Thompsonengineered ball joint for front suspension, we have added two new manufacturing plants at Fruitport, Michigan and at Portland, Michigan.

These two new plants enable Thompson to give you even better service and deliveries.

We invite you to investigate the numerous advantages of working with the expanded Michigan Plant of Thompson Products . . . of having your engineers work with the experienced Thompson engineers in solving your problems. Write, wire or telephone Thompson Products, Inc., 7881 Conant Avenue, Detroit 11, Michigan. WA 1-5010.





DETROIT MICHIGAN PLANT



PORTLAND MICHIGAN WORK





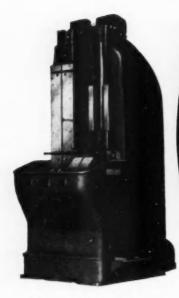
FRUITPORT MICHIGAN WORKS



Ball Joint for Front Suspension

Thompson Products

MICHIGAN PLANT
DETROIT - FRUITPORT - PORTLAND



Duplex Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

increased production latest surface broaching methods on cast iron parts, teeth serrations and slots...



Single Slide Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.



Continuous Type Broaching Machine. Made in 4 Sizes.

• Whether the material is steel or cast iron, parts are being successfully surface broached on Footburt machines. Broaches used on Footburt Surface Broaching Machines have a patented tooth that is especially advantageous on heavy cuts. We will be glad to work with you on your machining problems and make recommendations based on our many years experience in surface broaching.

THE FOOTE-BURT COMPANY, Cleveland 8, Ohio

Detroit Office: General Motors Building



Automotive Industries. September 15, 1953

Sealing Data you've never had before

Here are	Here are	And here is
he SAE-ASTM	the SAE-ASTM	the VICTOR
asket Material	Material	EQUIVALENT
pecifications	Classifications	of each item
G-1121	Class 1 — Natural and/or Synthetic Rubber and Asbestos (Compressed) Group 2 — Oil Resistant Item 1 — Med. Temp. & Max. Oil & Acomotic	Victopac #1
G-1122	Fuel Resistance (94) Item 2 — Max. Tempo & Good Oll & Arolnatic	
G-1123	Fuel Paristance (SB) Item 3 — Max. Temp. & Fair Oil & Aromatic Fuel	Victopac #50-V
041125	Resistance (SC)	Victopac #60-V
G-1422-1 G-1422-2 G-1423-2 G-1423-3	Group 2 Oil Resistant Item 2 — Max. Temp. & Good Oil & Aromatic Fuel Resistance (SB) Vem 3 — Max. Temp. & Fair Oil & Aromatic Fuel Resistance (SC)	Asbestopac #221 Asbestoprene #222 Asbestopac #232 Asbestoprene #233
G-1523-3	Class 5 — Natural and/or Synthetic Rubber and Miscellaneous Fillers Group 2 — Oil Resistant tem 3 — Max. Temp. & Fair Oil & Aromatic Fuel Resistance (SC)	Victorene S
G-3211	Class 2 Treated Paper Goup 1 Gelatin and/or Synthetic Resin Item Max. Oil, Water and Gasoline resistant	Viceorite B
G-3212	hem 2 - Good Oil, Water and Gasoline	Victorite B
G-3213	resistant Item 3 — Fair Oil, Water and Gasoline	Victorite G
G-3222	Group 2 Geatin anti/or Synthetic Resin Impresented Compositions (Wood, Cork, Leather, etc.) Item 2 Good Oit, Water and Gasoline resistant	Victorite R
G2243	Group 4 — Natural and/or Synthetic Rubber Impregnated Compositions (Wood, Cork, Leather etc.	

On non-metallic gasket materials for general automotive and aeronautical purposes, Victor now gives design engineers a valuable service not available heretofore. Above is a partial list of such packings in the new Victor Gasket Catalog. Note how each material is clearly classified by grade equivalence to standard SAE-ASTM specifications. And besides, Victor gives you

precise application data on each grade of product.

You'll save much time by using the new Victor Catalog. More important, it will help you assure dependable and economical sealing specifications. Talk it over with your Victor Field Engineer.

Victor Mfg. & Gasket Co., P. O. Box 1333, Chicago 90, Ill. Your New Complete Guide to Gasket Materials VICTOR ENGINEERING CATALOG No. 505 Supplied to Design Engineers by request on business letterhead.





PACKINGS . OIL SEALS

Special Handling of Cutting Fluids and Machine Lubricants

WITH the passage of time and accumulated experience, the Getty St. military plant of Continental Motors Corp., Muskegon, Mich., has been improving its facilities and methods for building military engines. Most recent of such developments has been the introduction of a formal system for handling metal cutting fluids, and the lubrication of machine tools and electric motors. These new projects are said to have produced some very interesting and tangible operating economies.

Typical of the Delpark cutting fluid filtering units installed in this plant is the one seen here. An interesting feature is that the unit serves one of a number of the big Bullard Mult-Au-Matics found in this plant. Similar units serve grinders, automatic lethes, and other machine tools.

By Joseph Geschelin

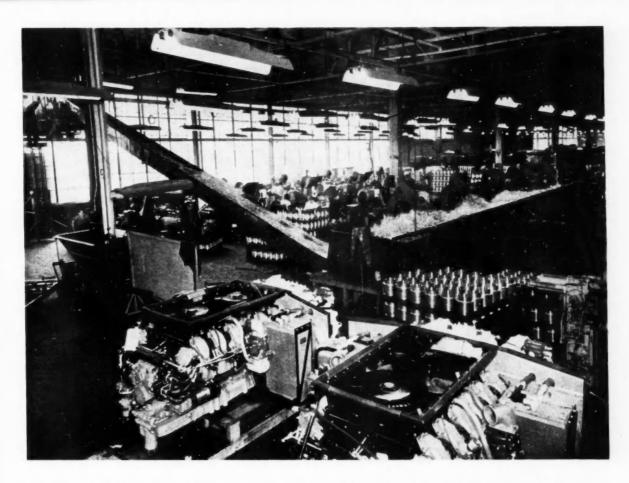
Considering cutting fluids first, it is of interest that the company has installed a large number of the familiar Delpark filters of individual type. It is not surprising to find Delpark filters on Cincinnati grinders, Bryant grinders, and similar precision type equipment. However, at Continental they have also applied these

filters on automatic lathes and turning machines as well as on big Bullard Mult-Au-Matics. On the extensive line of large Bryant grinders, wherever feasible, the Delpark filter is installed between two adjoining machines so as to serve two machines at a time.

Another matter of interest is the arrangement for handling the aluminum chips from the cylinder finning operation. These chips come out as long, curly strings, making a bulky handling problem since they produce about a half-bushel sized bundle of chips from each cylinder. Heretofore, it was necessary to have a number of men tending the automatic lathes, spending all their time scraping chips from the machines. Too, there was the added problem of removing and transporting chips.

Now it will be noted that each of the six finning machines is equipped with a flight conveyor arranged to carry chips out of the machine. In turn, the battery of six machines is connected to a conveyor within the trough, shown in the illustration, to carry away the bulky chip loads. This conveyor transfers its load to a belt conveyor which is installed at right angle and inclined to reach out of the building at a high elevation to facilitate gravity loading of big trailers. These trailers, incidentally, are conventional truck trailers with roof removed to provide large loading capacity.

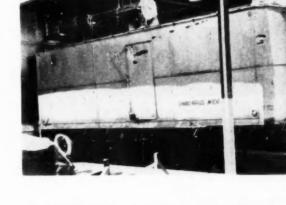
This method of chip disposal not only



Perspective view of automatic chip disposal system serving the battery of six automatic lathes in the center, background. The finning job on military engine cylinder barrels produces about a half-bushel of stringy chips per barrel. This material is conducted from each of the machines into the long trough in the center to the right, then transferred automatically onto the belt conveyor in the foreground. The latter carries its load upward and out of the building where it is dumped into large trailers.

solves the problem of handling the stringy chips but is also effective in eliminating the loading up of busy machines. Overall economy of this system is said to be outstanding.

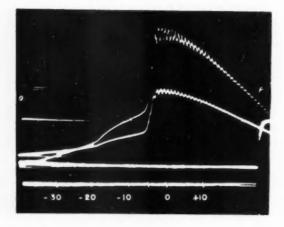
Having about 800 machine tools which use cutting fluids, the company recently placed in operation a formal system for controlling these materials, establishing regular change intervals, and setting up a schedule for sludge clean-out. This activity has been centralized and made responsible to the Superintendent, Care and Maintenance of Government Owned Property. It is made up of two sections: the technical branch, which includes a chemist on the first shift to supervise the analysis and testing of all cutting (Turn to page 110, please)

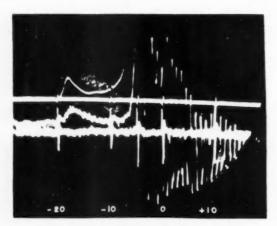


This view shows the constant load of stringy chips being unloaded from the conveyor chute and deposited into a trailer outside the building.

Automotive Industries, September 15, 1953

New Data on Combustion in Automotive Engines





Typical escillograms obtained by the National Bureau of Standards in studies of autoignition in a lean n-heptane mixture. The two traces in the upper phorograph are pressure-vs.-crank angle for pressure-vs.-time) curves, with different amplification, for a single compression-ignition cycle. In the lower photograph the bottom curve shows rate of pressure rise while the other curve shows radiation intensity. The cool flame begins at about 19 deg before top center; the hot flame starts at about 6 deg before top center and is followed violent knock vibrations [5.4 deg of crank angle is equivalent to one millisecond.] Fuel—N-heptane, .SS. Density—0.0144 lb mole/cu ft.

Research on engine combustion at the National Bureau of Standards is providing valuable information on the chemical processes which take place within the cylinders of an automotive engine during the combustion cycle. By use of a very fast acting valve previously developed by NBS, it has been possible to take samples of the rapidly changing combustion gas over extremenly short intervals. Analysis of these samples has yielded detailed knowledge of the proportions of reactants and products present at various stages of the cycle. The data thus obtained provide a basis for increased understanding of the mechanism of engine knock and carbon formation in the cylinders.

As the compression ratios of modern gasoline engines are continually raised, increasing difficulty is being caused by knock and preignition. The rapidly expanding use of Diesel engines has also emphasized problems of cold starting and engine roughness and smoking under heavy-load operation. All these difficulties are associated with the combustion phenomenon known as autoignition, which occurs when a fuel-air mixture is heated by compression until it ignites spontaneously without spark.

Seeking information that will lead to more efficient utilization of fuels, the NBS engine fuels laboratory has been conducting an intensive investigation of autoignition. Apparatus used includes a special single-cylinder engine of variable compression ratio in which a wide range of operating conditions may be simulated. The engine has been modified to permit the compressionignition of a single homogeneous premixed charge of fuel and air in the absence of burned residual gases. cylinder hot spots, and lubricating oil. Pressure, rate of change of pressure, and light emission are oscillographically recorded as functions of crank angle or time. At any preselected time during the course of the reaction, the special sampling valve can be used to remove a sample from the reacting mixture during an interval of about 0.2 to 0.3 millisecond. Use of this valve enables the reaction to be followed by mass spectrometric means.

Experiments have been carried out in the singlecylinder engine on a number of hydrocarbon fuels of

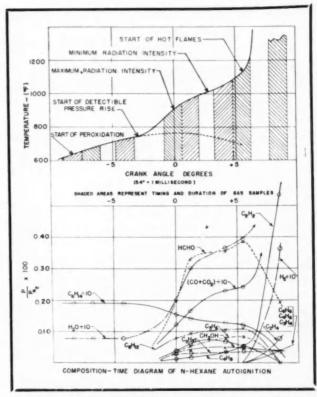
various chemical structures. In general, it has been found that the autoignition of a paraffinic hydrocarbon occurs in a series of stens. The first detectable reaction is the formation of peroxides at a temperature between 600 and 800 F. At a somewhat higher temperature, after peroxide concentration has become appreciable, a blue luninescence called the cool flame appears, accompanied by a substantial increase in temperature and pressure. When the temperature has risen to about 1100 F, the rate of reaction suddenly increases at a rapid rate as the hot flame begins. The accompanying violent pressure rise initiates a pressure wave which is reflected back and forth across the combustion space, causing audible knock.

Investigation of many pure hydrocarbons, isooctane-n-heptane blends, and oxygen-containing compounds has shown that as octane number and resistance to autoignition increase, the temperatures at which peroxides and cool flames are first detected also increase while the amount of heat released during the cool flame decreases. Over a wide range of fuel-air ratios, however, the temperatures at which hot flames first appear lie in the same temperature range-1100 F ± 50 deg-for all aliphatic compounds studied. Because the octane numbers and autoignition resistances of the fuels investigated vary widely, these properties are thought to be functions of the extent of "self-heating" in the early stages of the reaction. According to this view of the over-all process, a very highoctane fuel must be heated by compression

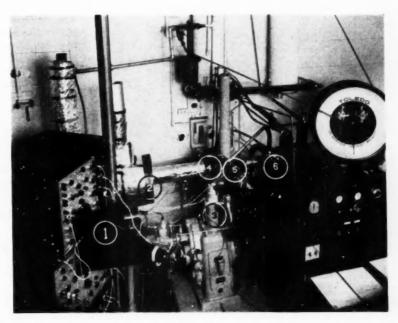
alone to nearly 1100 F before hot flames begin, whereas a low-octane fuel may contribute several hundred degrees of the required temperature rise by its own early reactions. Thus, the ease with which low-octane fuel autoignites is probably due to

(Turn to page 106, please)

Apparatus used in studies of the mechanism of combustion in gasoline engines. A special single-cylinder engine permits a single homogeneous fuel-air charge to be ignited by compression in the absence of residual exhaust gases, cylinder hot spots, and lubricating oil. Fuel metered by the flow system (6) is mixided with air in the vaporizing tank (2). Compression ignition occurs in the cylinder (4), which is isolated from crankcase oil by a crosshead (3). Pressure and radiation-intensity data are photographically recorded from two dual-beam oscilloscopes (1). Gas samples are taken over an interval of about 0.2 to 0.3 millisecond with a fast-acting sampling valve (5).



Composition-time and temperature-time diagrams plotted from NBS data on n-hexane autoignition. In the lower diagram the concentration of each component as determined in the mass spectrometer is shown in terms of its partial pressure referred to the partial pressure of nitrogen in the mixture. Shaded areas in the upper curve represent timing and duration of gas samples. Samples were taken over the period from the start of peroxidation until the hot flame was well under way. The dotted line in the upper curve represents the temperature time relationship for a non-reactive mixture in which autoignition would not take place.



European Civilian, Military Vehicles Lack Coordination

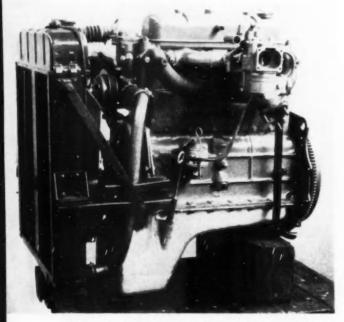
PARIS, FRANCE

OORDINATION of military and civilian automobile design has made little progress throughout Europe, while standardization is poor nationally and non-existent internationally. The gap is made wide by the fact that the military insist on gasoline for all purposes, while the civilian user of trucks and buses is about 99 per cent in favor of the Diesel when the piston displacement of the engine exceeds

200 cu in., and is more and more accepting the heavy oil engine of lower piston displacements.

Despite tendencies in certain directions, the gap between civilian and military vehicles is widening. If present military requirements are maintained, no mass of vehicles could be switched over from private to army use should an emergency arise. Examples could be given of organizations formerly producing exclusively very successful Diesel powered trucks but now also making gasoline engine powered trucks to fill military orders.

Britain has made some attempt to interlink the military with the civilian vehicles by placing contracts for approved army types, and at the same time allowing these to be sold to the public under certain conditions. While these vehicles are of the same general class, namely road haulers having some ability to operate under cross country conditions, there is no degree of standardization between one make and another.



Austin valve-in-head engine which is optional equipment on the British Jeep.



Civilian version of the Austin Champ model, which offers an option of engines.

CONDENSED ENGINE SPECIFICATIONS

By W. F. Bradley
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

ENGLAND	Head Type	Displacement (cu in.)	Comp. Ratio	Maximum hp
Land Rover	F	97	7.25	60 @ 4000 rpm
Austin (own)		162	6.8	75 @ 3750 rpm
Austin (Rolls-Royce)	F	173	6.4	80 @ 3750 rpm
FRANCE				
Delahaye	1	122	7.58	63 @ 3750 rpm
Renault	L	145	6.1	46 @ 2800 rpm
ITALY				
Fiat	1	116	6.7	53 @ 3700 rpm
Alfa Romeo	1	115	7.2	70 @ 4400 rpm

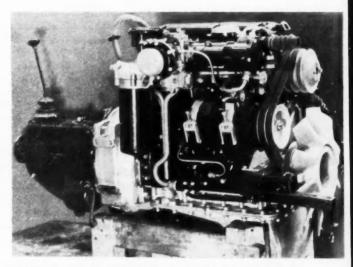
Ford enters into this class with a military 4 x 4, three-ton truck produced to the Ministry of Supply specifications, but also saleable to civilian users under certain conditions. This vehicle has the American Model R eight cylinder engine of 239.4 cu in., mounted in a 150-in. wheelbase chassis. A four-speed transmission and two-speed transfer box provide rear-wheel drive in second gear and four-wheel drive in first. With the exception of drive to all four wheels, power take-off, tow hooks and a few body details, there is nothing in the military version making this truck unsuitable for normal civilian service.

The Bedford 4 x 4, produced in the General Motors controlled Vauxhall works, comes into the same general class as the Ford, with a six-cylinder engine of

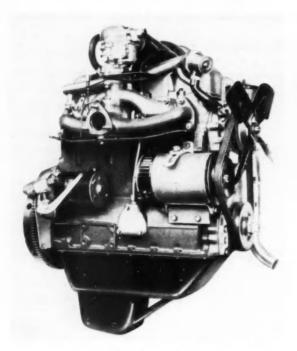
300 cu in. developing 110 hp at 3000 rpm. Another is the Austin 4 x 4, also with a six cylinder valve-inhead engine of 243.7 cu in., developing 90 hp. This has a military rating of one ton, but it is really a development of the Austin standard civilian two-ton truck. While all three are of the same general class, designers have been given a free hand and have not been called upon to provide interchangeability between one make and another. Morris has a truck of the same general type, but it is not even inter-



Military version of the Austin Champ model powered by Rolls-Royce engine.



Rolls-Royce standardized engine used on the Austin Champ model.



Fiat overhead-valve Jeep engine.

changeable with the allied Austin vehicle.

The most important standardization work of the British authorities is the adoption of three types of Rolls-Royce engines, having respectively four, six and eight cylinders. As the bore and stroke are the same, namely $3\frac{1}{2}$ in. by $4\frac{1}{2}$ in., it is obvious that there is a considerable degree of interchangeability and a very important reduction in the number of parts which have to be kept in stock. In addition to the wearing parts which are almost 90 per cent common to all engines, clutch housings and flywheel housings are interchangeable.

This Rolls-Royce "B" range is of the F-head type with inclined overhead intake valves and side exhaust valves. The crankcase is cast iron monobloc with short cylinder liners. The four cylinder 173 cu in. engine, with a compression ratio of 6.4, fitted with a single down draft Solex carburetor, develops 77 hp at 3500 rpm and weighs 650 lb. The six cylinder model develops 122 hp at the same speed, and the straight eight has its peak of 161 hp at 4000 rpm.

These three engines have been adopted by the Ministry of Supply for the complete range of wheeled combat vehicles for the armed forces. The applications range from a 4 x 4 light truck up to a 10 ton, six-wheel drive, load-carrying vehicle. Military requirements are: ability to operate in temperatures ranging from -40F to 120F and at imposed angles of inclination; also provision for wading, governing, radio interference elimination, and power take-off. They are being used on a Humber-produced one ton, 4 x 4 combat vehicle, an Austin Jeep, an Albion three-ton 6 x 6, and a Leyland 10-ton 6 x 6. The



Shown above is Flat Jeep-type, all-purpose vehicle. Illustration below shows details of the chassis.

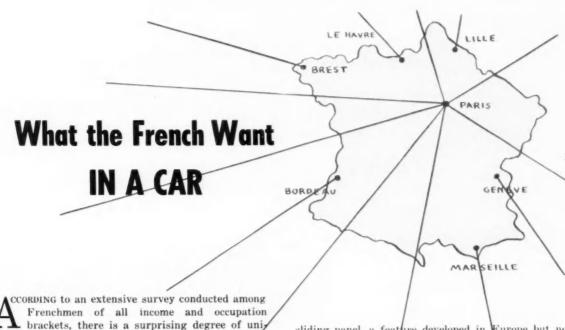
engines are used also on Dennis fire fighters and for airfield tenders.

The Rolls-Royce being costly, some makers offer their own engine as optional equipment. This is the case with the Austin Champ model which is sold in its purely military version with the standardized Rolls-Royce engine built by Austin, or with Austin's own engine of rather smaller size—162 compared with 173 cu in.—and developing 75 hp compared with 80 hp. Naturally, the selling price is much reduced when the 75-hp engine is specified.

Critics of the Government scheme maintain that the average life of an automobile on active service is only a few weeks and therefore it is a waste of money to build into any vehicle a life of 200,000 miles. Completely machined connecting rods and nitrided shafts may be fine mechanical achievements but they are luxuries when applied to a military vehicle. Being costly to manufacture, these engines cannot have a broad commercial application and even the semi-military types would not be immediately available in case of a crisis. The engines would have to be put into production and this delay would largely offset the advantage of having three standardized types with 184 interchangeable components.

Europe is decidedly interested in the Jeep-type automobile for both civil and military use. Six distinct types are in production: Land Rover and Austin in England; Delahaye and Renault in France; Fiat

(Turn to page 104, please)



Frenchmen of all income and occupation brackets, there is a surprising degree of uniformity in Gallic automobile tastes. Moreover, responses indicated that the "ideal" car is not yet being produced.

Certain popular features now incorporated in several French cars are, to be sure, included in the specifications. Road-holding qualities lead the list, well ahead of general durability and long engine life. Speed and elegance of appearance, on the other hand, are at the bottom of the list, following silence of operation.

Features of the "Ideal" Car

The "ideal" car, of course, is an optimum rather than minimum model, meaning that it does not necessarily correspond to the average French pocketbook. Briefly, it is a medium-size car of about 40 hp, priced at \$1700 to \$1850. The Simca Aronde and the Peugeot 203 fall in this class, although somewhat higher priced, but the survey shows that in other respects they do not qualify as the "ideal" car.

Following are the main features of this car:

- 1. Four cylinders (70 per cent of those interviewed).
- 2. An air-cooled engine (52 per cent) rather than water-cooled (48 per cent).
- 3. Front-engine, front-drive (65 per cent, well above the percentage of French cars powered in this manner). Primary emphasis on road-holding qualities accounts for this choice.
 - 4. Non-automatic transmission (75 per cent).
- 5. Maximum speed: 70 mph. Most French cars advertise speeds of 75 to 80 mph.
- Mileage: 26 miles per gallon on highways, 21 miles in the city.

Aside from engine and performance specifications, French drivers also have some definite ideas regarding style. More than 75 per cent want accommodations for four to five passengers (the two-seater has few partisans). Even more (85 per cent) expect four doors. A surprising 80 per cent want a top with

sliding panel, a feature developed in Europe but not used extensively in French cars.

Preferences as to body colors are varied. Some 20 per cent have no choice. Black, followed by gray, gets the biggest vote. Red, tan, blue and other colors are well behind.

Until the appearance of this "ideal" car, the French will continue to pick and choose among the various makes and styles now available. Gauged against the foregoing specifications, present French cars appear to have definite assets and liabilities. Following are notes on the major makes and models:

Renault Leads the List

As already noted, the small Renault is France's most popular car. Many young French couples give it top priority in planning their future purchases. Economists and sociologists have gone so far as to blame the country's housing problem on the popularity of the Renault, on the theory that personal income devoted to its purchase has held back the purchase of homes.

Not far behind the Renault in popularity is the 56 hp Citroën. With front-engine, front-drive, the car has excellent road-holding qualities. The car has lost ground, however, since its originality of design put it in top position 20 years ago.

New Citroen in Demand

The small two cyl, nine hp Citroën is another story. Introduced without fanfare, it has enjoyed an amazing reception. Delivery cannot be promised short of 18 months, because of the backlog of orders. Just about indestrucible, this utility car is simple to maintain and very cheap to run. Its noise and lack of power on hills do not seem to have turned away buyers looking for a truly inexpensive car. The price still runs around \$1000.

(Turn to page 100, please)

Landing Gear Struts Induction Preheated Before Arc Welding

By Merle W. McLaughlin Manager, Landing Gear Division, Willys Motors, Inc., Toledo, Ohio

Landing gear struts for Fairchild "Flying Boxcars" are among major defense products manufactured by Willys Motors, Inc., Toledo, Ohio. Because struts are made as light as is possible for such service, the heavily stressed parts have to be of exceedingly tough high-tensile steel. In the largest of these components, a tube of eight in. diameter having 3% in. wall has to be joined at each end to a steel forging by welding.

One of these welds is of the butt type and requires the use of an 800 kva resistance welder. This weld results in considerable flash both internal and external but, as the weld is near an open

end, flash removal is readily effected. Before making the second weld, a circular boss on a two-ear forging is slipped inside the tube.

Both the OD of the tube and of the shoulder on the forging are chamfered and the two chamfers and shoulders form a groove in which the arc welding beads are laid down. This groove is ½ in. wide at the top when the parts are set into the tacking fixture shown in Fig. 1. When locked in the fixture, the forging and tube are correctly located by pins and the fixture also establishes the correct angular relation between the forgings at the two ends.

When so located, the parts are tack welded at four points around the slot to hold them in correct position for final welding. Then the tacked unit is put into the positioner so that it can be rotated about the longitu-



Fig. 1.—Fixture in which strut leg parts are clamped for tack welding in correct relative position before the final arc weld that joins the forging at one end to the tube is made.

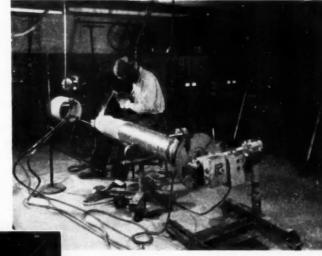
dinal axis as welding is done. Rotation occurs only when the operator presses a foot switch. It is specified, however, that the parts to be welded be heated to 70° F before welding and that they be kept at this temperature while welding proceeds so as to avoid the chance of underbead cracking.

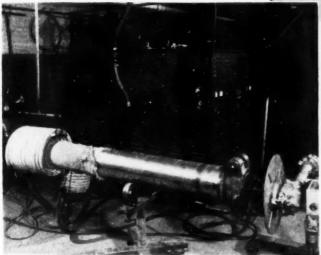
Initial heating to 700 F is done by placing the weld area inside the induction heating coils shown in Fig. 2. A thermocouple is clamped to the workpiece and connected to an indicating pyrometer that shows the operator the temperature. An auxiliary unit provides a graphic record of the temperature.

As the welding cannot be done inside the induction coil, the workpiece is removed when up to temperature but is kept hot thereafter by playing a reducing gas flame on the weld area throughout the welding

Fig. 3.—Using Lincoln equipment to make the arc weld that joins the tube to the forging while it is rotated slowly in a positioner. A gas flame is adjusted to keep the area at the weld at 700 F while welding proceeds.

Fig. 2—After tack welding in the fixture, Fig. 1, one end of the strut is set inside an induction coil, left, for raising to a temperature of 700 F the 4130 steel adjacent to the area where arc welding is to be done.





starting the next pass. After each bead is completed, its entire exposed surface is cleaned with a rotary wire brush to make sure that the surface is free from any scale or oxide before the next bead is laid down.

These precautions not only insure proper bonds between successive beads but help to insure against under-bead cracking. Visual checks are also made to see that porosity is avoided and X-rays have been made as a further check to show that sound welds are obtained.

After welding is completed, the weldment is placed in a furnace at 700 F after which the temperature is raised to 900 F for three hr. Before removal from this

stress relieving furnace, the furnace temperature is lowered to 600 F after which weldments are cooled slowly in air for 1½ to two hr.

All foregoing procedures are made in accordance with Air Corps specifications. Resulting welds afford joints having a strength fully equal to that of the parent metal and capable of resisting the severe stresses encountered in service.

period. This flame is kept adjusted by the welder to hold the temperature at 700 F.

The arc weld, Fig. 3, is made using a ½ in. low-hydrogen electrode with d-c welding current supplied by a 300 amp Lincoln machine. In laying down the initial bead, the operator stops at each tack weld and grinds it out before continuing the bead. He also grinds out the crater at the end of the bead before

Big Manganese Deposit Found in Africa

U. S. Steel Corp. will participate in developing a newly discovered rich deposit of manganese ore in French Equatorial Africa. Discovery of the deposit is considered significant from an economic and political standpoint, since up to now Russia has controlled the biggest manganese deposits and has greatly limited purchase by the United States. However, U. S. industry has been obtaining adequate supplies of manganese from India, South

Africa, Brazil, Chile, and Cuba. The African deposit is reported to be so huge that it could provide adequate supplies for the United States for the next hundred years based on present consumption figures of 1.5 million tons a year.

Wisconsin Motor Honored by Advertising Group

In a national advertising awards competition recently sponsored by the First Advertising Agency Group, Wisconsin Motor Corp. received a first award. The award was granted for a 64-page brochure entitled "Your Picture Tour of Wisconsin Air-Cooled Horsepower in Action."

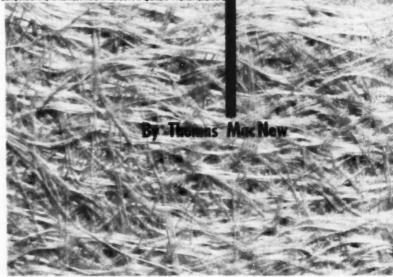
Hall-Scott Awarded Government Orders

Government contracts amounting to over \$2 million have been received by Hall-Scott Motor Div. of ACF-Brill Motors Co. One order is for the manufacture of gun recoil mechanisms, the second is for the production of ammunition.



At left is diamond mat of glass fiber, used with polyester resin for reinforced plastic production.

At right is glass fiber chopped strend mat for reinforced plastics.



Automotive and Aircraft Applications Have Been Increasing at an Accelerated Rate. With the New Materials Now Available, Still Further Advances Are Foreseen. Research Continues to Develop Additional Plastics and Techniques

HIS year will no doubt be marked down in the automotive record book as the kickoff of plastic car production with the marketing of the Chevrolet Corvette. Over the past several years, the plastic materials have been coming more and more into prominence; and the huge role they play in today's production and design, and the vast amount of development work for automotive vehicles and aircraft are indicative of the market.

At this time, the polyesters—in the form of reinforced plastics for automobile bodies and experimental aircraft wings and fuselage components — are

stirring up the greatest interest, and no doubt rightly so, but the field is not concerned only with that one product. To date there has been a great diversity of plastic materials which have been made available to industry, and many of these have been put to use for a large variety of automotive components. Also, there are other plastics which are coming along and which will no doubt be available to the trade in the near future. No longer are the plastics thought of as something just to make the car more attractive, but are looked at as functional materials which perhaps do a better job than some other basic material.

Bodies and Components

Taking into consideration the reinforced plastics first, application of the material in automobile construction dates back to 1946 when a car was built in Owens-Corning Fiberglas Corporation's Newark, Ohio, plant making use of Fiberglas-reinforced plastics not only for the body, but for the frame as well. The metal used structurally in the car—a joint venture of Owens-Corning and a passenger car maker—was in the running gear assemblies.

Since that period, automotive uses have included sports car bodies, 3400-gal and 1000-gal oil tanks for truck tank trailers, truck cabs, passenger car trunk liners, convertible "hard top" units, taxicab jump seats and doors and interlining for refrigerated trucks. While most such uses have been in limited production, consideration of the materials as automotive components has assumed new significance since two passenger car makers-Chevrolet and Kaiser-Frazer-and several airframe makers have either gone into reinforced-plastic component production or are seriously considering doing so. The Chevrolet Corvette body parts will be produced by Molded Fiber Glass Body Co. and Lunn Laminates, Ohio, Inc., both located at Ashtabula, Ohio, as well as by Chevrolet's facilities in Flint, Mich. Winner Manufacturing Co., Trenton, N. J., and Lunn Laminates Ohio, Inc., will make body components for the K-F car. Chevrolet's Corvette body, it is said, will consist of approximately 32 minor and 30 major parts. It is stated that the Kaiser Darrin body will have about 26 parts, assembled into a front and rear section.

Strick Co. of Philadelphia, Pa., is making use of reinforced plastics for a structural door and corrugated lining for its new line of refrigerated trailers. In extensive tests over a 12 month period, the trailer is said to have proved 25 per cent more efficient in respect to refrigeration than the former design. The weight saving over the conventional design permits increasing the payload by as much as 1000 lb.

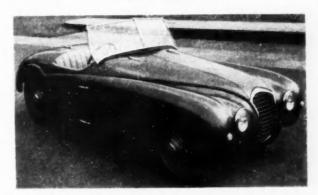
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One piece body shell made of glass-reinforced polyester resin plastic for a Lancia chassis. Made in England, this body shell features 3/s in. steel tubing for bracing. The tubing is incorporated during the molding process.



Celanese polyesters were used to produce the plastic body of this Allard sports car.



reinforced plastic body made in eight sections has been attached to a sports car chassis by an English maker.



The plastic car market was given impetus with the production of the Carvette by Chevrolet.



Sports car body made of glass-reinforced Bakelite polyester resins.

In addition to the aforementioned, there have been several sports car bodies manufactured by small manufacturers as well as station wagon bodies, trunk lids, translucent hard tops, hoods, glove compartments, seat frames, instrument panels, fenders, bumpers, leaf springs, and doors which have been made experimentally by some of the large automobile manufacturers. One of the first body makers to start production on a limited scale was Glasspar Co., Santa Ana, Calif. The Glasspar body is composed of 80 per cent resin-Vibrin, made by the U.S. Rubber Co., Naugatuck Chemical Div.-and 20 per cent glass fiber (AUTOMOTIVE IN-DUSTRIES, May 15, 1952, and December 1, 1952). Another fabricator, Industrial Plastics Service, has recently made a car body which is said to be one of the largest ever produced. Designed to fit 123-125 in. wheelbase chassis, the integral body and hood has an overall length of 192 in. and a width of 72 in. Weight of the complete body is approximately 220 lb. The polyester resins used by the maker were supplied by the Bakelite Co.

Celanese Corp. of America entered the polyester field recently when it acquired the Marco Chemical Co. In addition to those resin makers already mentioned, others include: American Cyanamid Co.; Atlas Powder Co.; General Electric Co.; Glidden Paint Co.; Pittsburgh Plate Glass Co.; Plaskon Div., Libbey-Owens-Ford Glass Co.; Reichhold Chemicals, Inc.; Rohm & Haas Co.; and Schenectady Varnish Co. The polyester manufacturers had a total capacity of well over 30 million lb at the end of 1952. Actual sales ran around 19 million lb for 1952; 27 million lb is the estimate for 1953 sales.

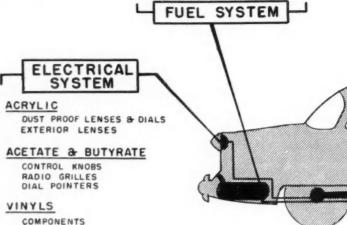
According to General Electric Co., which is producing polyester resins at its Anaheim, Calif., plant, the automobile industry will use approximately \$3.5 million worth of polyester resins for complete bodies and sections through 1954.

Speaking before an SAE meeting recently, Games Slayter, vice-president, Owens-Corning Fiberglas Corp., gave the economic viewpoint of the reinforced plastics for automotive production. He said that if physical properties demand the strength pattern of a fabric for plastic reinforcement, the price will not suit

PHENOLICS CARBURETOR PARTS

NYLON

CARBURETOR VACUUM
CHECK VALVE
FUEL PUMP VALVE
CARBURETOR NEEDLE VALVE



PHENOLICS

INSULATION

NYLON

FUSE HOLDER DOME LIGHT LENS SEALED BEAM UNIT LOCK NUT LAMP SOCKET BUSHING SOLENOID INSULATOR GENERATOR INSULATOR FUSE BLOCK COVER DIRECTIONAL SWITCH STARTER MOTOR INSULATOR DISTRIBUTOR WIRE CLIP AUTOMATIC STARTER SWITCH ROTOR FOR HEADLIGHT FOOT DIMMER TAIL LAMP CONNECTOR HORN RING INSULATOR MOTOR COMMUTATOR END PLATE IGNITION SLEEVE DISTRIBUTOR PLATE SEPARATOR DISTRIBUTOR CABLE HOLDER RETAINER RINGS

ACRYLIC

FENDER GUIDE LIGHT DECORATIVE MEDALLIONS HOOD ORNAMENTS

ACETATE & BUTYRATE

MOLDINGS
BRAKE HANDLES
STEERING WHEELS
GEAR SHIFT KNOBS
GRAB RAILS
ARM RESTS
BEZELS

COPOLYMERS

STAT. WAGON ROOF RAILS WHEEL HOUSE COVERS SEAT BACKS SEAT SIDE PANELS CRASH PANELS

SOME TYPICAL

the automotive market at this time. "If physicals can be had by use of mats and rovings—as they can—then we are very much in the picture," he went on to say. In these forms, fibrous glass is priced at 40 to 50 cents per lb. The price of resins varies widely, he added, but generally speaking they will be in the same range as the fibrous glass or perhaps a little less expensive.

In order to give a little push to the already rapidly increasing use of the polyesters, two companies, Monsanto and Allied Chemical, cut the price of maleic

PHENOLICS ACRYLIC CLUTCH DISCS TRAFFIC LIGHT VIEWER LENS NYLON ACETATE & BUTYRATE CLUTCH CROSS SHAFT BAGGAGE RACKS REARING SPEEDOMETER TAKE-OFF GEAR NYLON SPEEDOMETER WORM GEAR WINDSHIELD WIPER GEAR AUTOMATIC TRANSMISSION (ELECTRIC) WINDSHIELD WIPER VALVE TRANSMISSION PURSE HANGER ACCESSORIES ENGINE PHENOLICS WATER PUMPS RADIATOR STRAINERS NYLON ROCKER ARM COVER SEAL LINE CONNECTOR SPARK PLUG GASKE OIL PAN DRAIN PLUG GASKET WATER PUMP CONNECTOR THROTTLE SHAFT BEARING

REINFORCED PLASTICS

BODY

TRUNK LIDS GLOVE COMPARTMENTS CAR BODIES HOODS CAR TOPS SEAT FRAMES

VINYLS

UPHOLSTERY
SCUFF PADS
FENDER WELTS
SOCKET SEALS
FLEXIBLE GLAZING
DOOR PANELS
ARM REST PADDING
WATER PROOFING
DOOR BUMPERS
GASKETS
PEDAL PADS
GLASS SEALS

POLYVINYL ACETAL

SAFETY GLASS INTERLAYER

PHENOLICS

WATER PROOFING PLATED PARTS

NYLON

DOOR HINGE BUSHING WINDOW ROLLER WASHER DOOR STRIKER WEDGE

BEARING & BUSHING FOR CONVERTIBLE TOP MECHANISM RADIO AERIAL ACTUATING CABLE AIR-CONDITIONING UNIT GRILLE SUN VISOR BUSHING & WASHER WINDOW REGULATING GEAR

CONVERTIBLE TOP ACTUATING CABLE JACKET

RUNNING GEAR

VINYLS

VALVE CAPS

PHENOLICS

BRAKE LININGS

NYLON

TIRE VALVE CAP
BRAKE PEDAL BUSHING
MASTER BRAKE CYLINDER
PUSH ROD BUSHING
SHOCK ABSORBER PISTON RING
SHOCK ABSORBER GUIDE RING
AIR BRAKE POPPET VALVE

PLASTIC PARTS FOR AUTOMOBILES ,

anhydride and fumaric acid which are used in the production of reinforced plastic chemicals. The price cut, about five cents per lb, brought the two raw materials down to approximately 32 cents per lb.

Experimental work on glass-fiber plastic bodies and components is now being conducted by a number of British manufacturers. Also, work is being carried out in Denmark—a four-door sedan is in the planning stage—and Argentina where a sports car called the Justicialista Sport is said to be going into production

soon by A.I.M.E., the state-owned automobile factory.

Current production methods in England have in few cases gone beyond hand lay-up of cold-setting polyester resin plastics on male or female molds, since this is still the most economical method for the existing prototype work. Costs are high, with the raw materials being as much as \$1.40 per lb, and for the present the main application is seen in special orders for custom bodies in limited numbers. But while a mass market is not yet contemplated, much wider utilization

MANUFACTURERS OF AUTOMOTIVE AND AIRCRAFT PLASTIC PARTS

Manufacturers in this list selected from membership list of Society of The Plastics Industry and other sources

aaRBee Plastic Co. Accurate Molding Corp. American Hard Rubber Co. American Molding Co. Auburn Button Works, Inc. Bangar Plastics, Inc. Boonton Molding Co. Brever Molding Co. Bridgeport Molded Products, inc. Brilhart, Arnold, Ltd. Cadillas Plastic Co. Casco Products Corp. Chicago Molded Products Corp Chicopse Mfg. Corp. of Clever Box & Mfg. Co., Inc. Consolidated Molded Products Corp. Continental Can Co. Continental-Diamond Fibre Co. Cruver Mfg. Co. Danielson Mfg. Co. Dura Plastics, Inc. Electric Auto-Lite Co. Erie Resister Corp. Evans-Winter-Hebb, Inc. Felsenthal, G. & Sons, Inc. Firestone Plastics Co. Gemioid Corp. Gen'l American Transportation Corp. General Electric Co.

General Industries Co. General Molded Products, Inc. General Motors Corp. General Products Corp. Gits Molding Corp. Glassper Co. Gregory Fount-O-Ink Co. Grotetite Co., Inc. Gulliksen, Wm. M. Mfg. Co. Hardy Plastics & Chemical Hood Rubber Co. Hoosier Cardinal Corp. Hyde, A. L. Co. Kent Plastics Corp. Kerr. R. W., Plastic Co. Kopplin Molding Corp. Kurz-Kasch, Inc. Lincoln Industries, Inc. Lunn Laminates, Inc. Lyon, Inc. Michigan Plastic Products, Inc. Midwest Molding & Mfg. Co. Midwest Plastic Products Co. Minnesota Plastics Corp. Molded Fiber Glass Body Co Nalle Plastics, Inc. National Automotive Fibres, National Vulcanized Fibre Co. Northern Industrial Chemical Co.

Norton Laboratories, Inc. Nosco Plastics Pacific Hard Rubber Co. Parisian Novelty Co. Peerless Moulded Plastics, Inc. Penn-Plastics Corp. Plastic Manufacturers, Inc. Plastic Process Co. Plastic Research Products Co. Polymer Corp. Prolon Plastics Div. Quality Plastic Co., Inc. Ranger-Tennere, Inc. Reynolds Metal Co. Rezolin, Inc. Santay Corp. Show Insulator Co. Shellmar Products Corp. Sobenite, Inc. Standard Products Co. Sterling Injection Molding, Inc. Sterling Plastics Co. Stimsonite Plastics Synthane Corp. Taylor Fibre Co. Valley Molding Co. Washington Molding Co., Inc. Westinghouse Electric Corp. White, S.S. Dental Mfg. Co. Winner Mfg. Co. Yardley Plastics Co. Zenith Plastics Co.

prising hood and fenders for an Allard 85 hp sedan.

A prototype sports body consisting of eight separate sections has been built by the Galt - Glass Div., Durasteel Ltd. Total weight is just under 80 lb, and doors and rear trunk lid have been constructed from inner and outer panels molded together. Materials used were woven glass cloth and polyester resin plastic in a female single-surface mold. The body is fitted to an all-welded tubular chassis powered by a 42-hp engine. and it is stated that other body designs are now in course of production.

At the British Plastics Exposition in London recently, a plastic body designed to fit a Lancia chassis was shown. This had been built up on a plaster of Paris male mold in one piece by impregnat-

ing successive layers of glass fiber mat with cold-setting polyester resin. Fabricated as an experimental project by a private exhibitor, the shell weighs some 100 lb and is braced with $\frac{5}{8}$ in. steel tubing, conforming to the body lines, which is incorporated during the molding process. The body may be removed from the chassis in a few minutes by loosening eight bolts and unplugging electrical connections.

Another exhibit at the London show was a range of replacement front fenders for a number of popular light cars displayed by Ashdowns Ltd. With the promise of increasing use of reinforced plastics, Fibreglass Ltd. has extended the variety of its products, which now include woven glass cloth, chopped strand mat, diamond mat, rovings, surfacing mat, tape and chipped strands.

One U. S. company concerned about the time consuming task of smoothing down plastic bodies prior to painting is said to be working on a development which will eliminate the finishing procedure. Now in the field testing stage, the product is expected to be made available within the next few years.

is expected in the future and it is understood that molding with matched dies is now being investigated.

The North East Coast Yacht Building and Engineering Co., Ltd., of England has come closest to a generally marketable product with a sports body fabricated from Bakelite Ltd. plastic-bonded glass fiber mat. Standard front and rear sections are made as separate pieces, with the over-length door panels intended to be cut to size according to the length of the individual chassis. The body is supplied in kit form by R. G. S. Automobile Components Ltd., and it is anticipated that the car owner will do his own tailoring and installation. Weighing 90 lb, the body is treated with a primer coat for a conventional finish and is said to withstand temperatures of up to 392 F.

Extensive experiments with a plastic hard top for an Austin A40 convertible were successfully conducted during last winter. This was made by Vanden Plas Ltd., using a Microcell Ltd. plastic molding reinforced with woven glass fabric. It has a good finish, is light in weight, and may be easily removed as a unit. Microcell has also produced a plastic front end unit com-

A relatively new materialnylon-was first used for automobiles about five years ago. Because of its properties-resistance to abrasion, corrosion, and flexural fatigue; resilience; dimensional stability; adaptability; and low coefficient of friction - its utilization has been rapidly increasing for functional body components. Today, it is being used for such body components as door hinge bushings, window roller washers, door striker wedges, bearings and bushings for convertible top operating mechanisms, air-conditioning grilles, radio aerial actuating cable, sun visor bushings and washers, and convertible top actuating cable jacket. Du Pont, sole manufacturer of this thermoplastic material, attributes the rapid success of nylon to the ingenuity of automotive designers and engineers in utilizing its desirable properties. Some of the latest applications of the materials are for seat upholstery, and door slides. The latter is about to go into production for an internal door opening mechanism for Cadillac. The nylon most generally used for automotive parts is FM 10001.

The vinyls, another line of thermoplastics, are found in many body component applications. During 1952, the vinyl producers put out 400 million lb of the material—a considerable portion of which

was used in the manufacture of automotive parts and accessories. Practically all of the vinyls are chemical and water resistant and are unaffected by gasoline and oil. Generally, all vinyls resist abrasion of normal use and are resistant to heat up to 130 F. It is usually recommended that the vinyls be used in the car interior to prevent weathering, although special types for outdoor use are available. Probably, the first major use of vinyl plastics for automobiles was for safety glass. This of course, is one of the major uses for polyvinyl butyral today. Current typical applications of other vinyls include upholstery, scuff pads, glass seals, pedal pads, door bumpers, gaskets, fender welts, flexible glazing, socket seals, door panels, water proofing, and arm-rest padding.

Monsanto's Plastics Division plant at Springfield, Mass., is probably the largest producer of the vinyl butyral interlayer used to make windshields and door glass shatterproof. According to Monsanto, the use of Saflex and the laminated sandwich for automobiles is increasing. Monsanto recently announced a 50 per cent expansion to keep pace with the amount of mate-

PLASTICS MATERIALS MANUFACTURERS

(Supplied by Society of The Plastics Industry)

American Cyanamid Co. Amer. Molding Powder & Chem. Corp. Bakelite Corp. Borden Co. Catalin Corp. of America Ciba Co., Inc. Celanese Corp. of America Continental-Diamond Fibre Co. Dow Chemical Co. duPont de Nemours, E. I., **Durez Plastics & Chemicals**, **Firestone Plastics** General Aniline & Film Corp. General Electric Co. Gering Products, Inc. Goodrich, B. F., Chemical Co. Goodyear Tire & Rabber Co. Hercules Powder Co. Interchemical Corp. Kellogg, M. W., Co. Koppers Company, Inc. Monsanto Chemical Co. Naugatuck Chemical Div National Vulcanized Fibre Co. **Nixon Nitration Works** Owens-Corning Fiberglas Corp. Pittsburgh Plate Glass Co. Plaskon Div. Reichhold Chemical, Inc. Rohm & Haes Co. Synthane Corp. Taylor Fibre Co. Tennessee Eastman Corp.

Westinghouse Electric Co.

rials required by the automobile industry. Larger, heavier windshields, and the trend toward the tinted windows is mainly responsible. Monsanto pioneered with the glass manufacturers in developing the graduated tinted windshields. In announcing the Saflex expansion program, R. K. Mueller, general manager of Monsanto's Plastics Division, commented on one of the problems of supplying the industry. "The most recent expansion at Springfield," he said, "should provide sufficient margin to meet peak loads created by seasonal buying habits or restyling programs. Experience during the past decade has taught us that the automotive production curve continues upward, but in a series of peaks. Our expansion is an attempt to compensate for those peak overloads and to provide improved service for the industry."

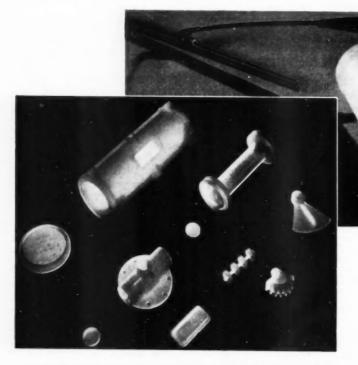
Cab liners made from foamed, or expanded Marvinol — a vinyl produced by the U. S. Rubber Co. —are used in military trucks in the Arctic regions. Clear sheets of Marvinol are being used for rear windows in convertibles. Several firms are injection molding Marvinol for door lock-buttons. Also, the product is being made into slip covers by automotive suppliers. Other possible applications include windshield wipers, floor mats, and door seals.

Saran or polyvinylidene chloride, a vinyl made by The Dow Chemical Co., is being used as a headlining material as well as some of the other body applications. (*Turn to next page, please*)

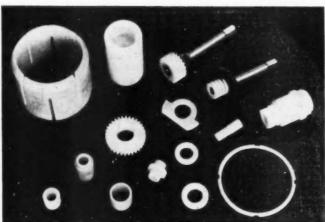
WEIGHT COMPARISON OF PLASTICS -

(1b per car)

2.0 2.5	0.9 0.6 0.0
	0.0
211	0.0
2.2	1.4
2.1	1.3
1.5	0.0
10.4	4.2
	2.1



Windshield wiper motor assembly and components, designed by Sprague Devices. It utilizes all nylon parts except for the fasteners. The unit is air operated and has been designed for trucks and buses.



Miscellaneous nylon parts being produced by the Polymer Corp.

Other vinyl producers include E. I. du Pont de Nemours & Co., Inc.; Bakelite Co.; General Aniline & Film Corp.; B. F. Goodrich Chemical Co.; Firestone Plastics Co.; Nixon Nitration Works; and Goodyear Tire & Rubber Co.

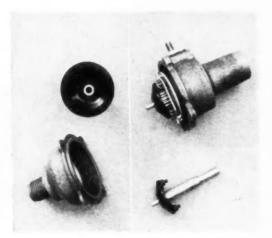
The acrylic plastics, produced by Rohm & Haas Co. (Piexiglas) and E. I. du Pont de Nemours (Lucite) is used primarily for decorative trim and ornamentation in respect to body parts. However, complete instrument panel lenses have been made of acrylics for Nash and Chevrolet passenger cars. Exterior sun visors and traffic light finders are also made of the material. One of the features of this plastic is optical clarity, and in addition it is weather resistant and

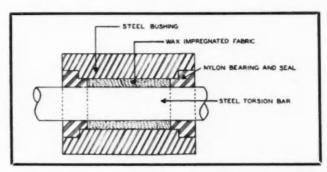
color stable. The material can be supplied colorless or in a range of transparent, translucent, and opaque colors. On the instrument panel applications, the dial markings are molded into the material, then colored, and the entire panel is edgelighted from a concealed source. One of the most significant developments concerning sheet Plexiglas rather than the molding powder is the use of the material for demountable side windows on the Chevrolet Corvette. Included in the design of these windows is a "Ventapane" acrylic section, corresponding to the no-draft ventilators on conventional cars. It is felt as though this utilization will hasten the widespread use of acrylic plastic, because of its safety features, for other-than-windshield glazing on cars, trucks, and buses. By means of metallization, a vacuum deposition of metallic particles, the acrylics may in the future replace many functional chrome plated parts.

Wind deflectors of Lucite for front windows are designed to prevent air from rushing into the back seat when the front windows are lowered. Another interesting acrylic product is the air-conditioning duct-work used on Cadillac.

Primarily for interior use, the cellulosics—acetate and butyrate—have been used for a variety of body parts. Available in a wide variety of colors as well as clear transparent, this family of plastics is strong and durable and retains a lustrous finish under normal conditions. Abrasives will mar their finish and the cellulosics are subject to weathering, except for cellulose acetate butyrate which is the most widely used in the automotive industries. During 1952, some 96.3 million lb of the cellulosics were produced by nine companies. Automotive companies used approximately 12 million lb, not including accessory or replacement items.

Perhaps the two largest uses of the material are





 Speedometer adapter assembly for Eaton two-speed rear axles. Nylon is used for planet carrier and ring gear.

Cross-section of military tank torsion bar bearing assembly. Nylon bearing, lubricated by impregnated fabric, takes instantaneous shock loads of up to 100,000 psi, and also high cornering loads.

for steering wheels and arm rests. Other parts include trim moldings, bezels, ash tray housings, grab rails, brake handles, knobs, front and rear radio speaker grilles, and bus baggage racks. Since cellulose acetate butyrate has a low thermal conductivity, it is ideal for such items that are normally handled in everyday use. One automobile producer claims that the wide range of colors available, good stability under interior conditions, adequate toughness, and adaptability to varying fabricating techniques at reasonable costs make butyrate a desirable material for such applications as those previously mentioned.

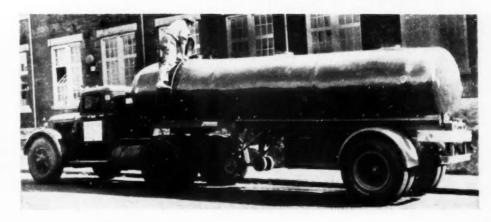
One plastic material which is only beginning to be exploited in the automotive market is styrene-buta-diene copolymer sheeting. Currently there are only a few items in production, air-conditioning ducts and snap-in headlining for station wagons—both at General Motors, and crash pads at Nash. This material has a low thermal conductivity, is abrasion resistant, is easily formed, and can be readily machined or bonded. Although the sheeting can be made decorative for interior parts, it is not generally recommended for outdoor use because of ultra-violet degradation.

(Turn to page 88, please)



Corrugated sheets of reinforced plastics are being used for the lining of refrigerator trailers by the Strick Co.

American Cyanamid's
Laminac polyester
resin reinforced with
fibrous glass was
used to make this
3400 gal transport
tank for commercial
trucking. It is one
of the largest onepiece molded structures ever made. The
tank which was molded by Carl N. Beetle
Plastics Corp.,
weighs 3500 lb less
than the one it replaces.



Novel

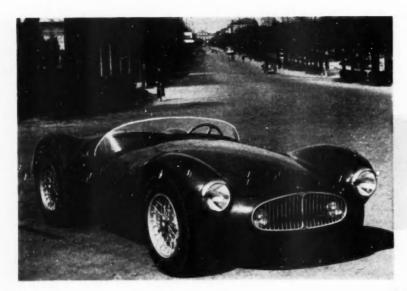
ITALIAN STYLING

NTEREST in the Italian school of body design is worldwide, as evidenced by the increasing number of American and other foreign chassis with bodies by the carrozzeria-custome builders — Bertone, Castagna, Farina, Ghia, and Vignale.

A high order of development in chassis design and construction has been maintained in the postwar period, as successes in recent road races have proved. For the professional or wealthy amateur driver Italian builders offer some interesting new machines, such as the Touring-Pegaso with an air tunnel over the rear fender for stability as shown in one of the illustrations. Superb hand work in the superleggera - super light - aluminum bodies, with leather interiors of the highest quality, characterizes the coachwork of these small shops of Milan, Turin, and Modena.



The successful Ferrari 250 Millemiglia road racer with body by Farina has the well-known V-12 three-liter engine (180.1 cu in.). With 9 to 1 compression ratio it develops 240 hp at 7200 rpm. Wheelbase is 93.6 in., weight (empty) is 1870 lb.



The new Maserati A&GCS twe-liter (120 cu in.) sport-competition car is of orthodox design, with a tubular frame, independent front suspension and semi-elliptic rear springs. The sixcyl engine develops 160 hp at 7000 rpm. Twin overhead camshafts are used, and the block is an aluminum alley. Weight of the 90-in wheelbase car is 1540 lb.



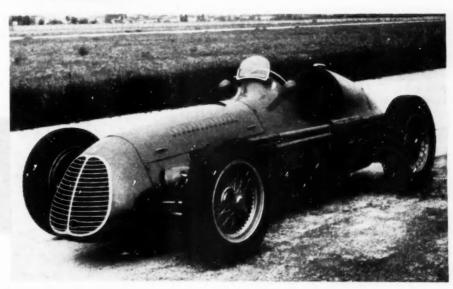
Carrozzeria Touring builds the Superleggera two-seater "Berlinetta" on the Spanish Pegaso Z102B chassis. Touringalso designed and built the body for the Alfa Romeo Flying Saucer displayed re-ently at the Turin show. (See AUTO-MOTIVE INDUSTRIES June 1, page 48).



For open-car fans Touring designed this two-seater "Tibidado" on the Pagaso Z1028S chassis with supercharged engine.



Carrozzeria Touring designed this "Thrill" model body which is mounted on a Pegaso chassis. Note the stabilizing fin which is attached to the rear fender and top of the body.



The Maserati A6GCM two-lifer racing car weighs only 1276 lb. With 13.75 to 1 compression ratio the six-cyl engine develops 190 hp at 7500 rpm.

Special Camera Expedites Aircraft Projects

By C. L. Pogorel Supervisor

Tooling and Photo Reproduction, Consolidated Vultee Aircraft Corp.



Depth of the bellows in the new camera is illustrated here. Maximum extension of the removable bellows is 144 in. This aft view of the camera also shows the ground glass left, and the film holder, like the copyboard has a vacuum installation.

A SPECIALLY built template camera is now in use at the San Diego Division of Consolidated Vultee Aircraft Corp. to facilitate engineering and tooling for several aircraft projects. Specifications and general design of the big camera were completed by Convair graphic arts technicians, and the equipment was built by Consolidated Photo Engravers and Lithographers Equipment Co., Chicago, Ill.

The all-metal camera, which is an overhead type, has a bed 29 ft long made of 14 in. diameter steel tubes with a $\frac{5}{8}$ in. wall. It is reinforced with four in. by four in. steel box sections and machined rails. One end of the bed is suspended on a metal "A" frame which is provided with a shock mount. The rear case provides the support for the other end of the bed. It is also provided with shock mounts so that optical parts of the camera will be unaffected by vibration.

The copyboard and lens board are large gray iron castings suspended from machined rails. Machining on the top rails and bearings which support both copyboard and lens board is of such high quality that only a 1/20-hp motor is required to move the heavy assemblies. Power is transmitted to an endless cable through a variable speed transmission, making it

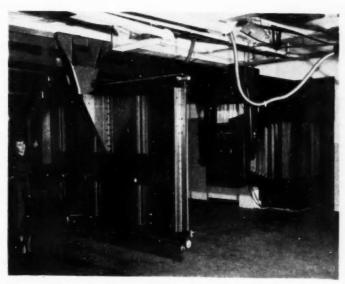
possible for the operator to vary the speed of movement of both copyboard and lens board.

Controls focusing the camera are located in four positions. One set is located inside the darkroom. Three sets of controls are located in the galley, one at the lens board, and two on the copyboard.

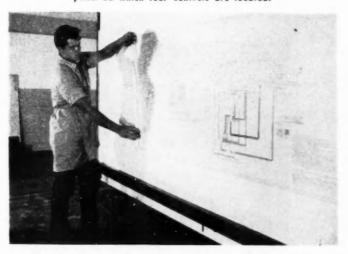
Calibrations in percentages for three lenses—a 42-in. Goerz, and a 36-in. and 24-in. Zeiss—are on a single steel tape. The image on the steel tape is magnified and projected to the operator's eye level by the use of a periscopic arrangement. This feature allows the operator to focus at eye level instead of looking at an overhead tape.

The 60 in. by 144 in. all-metal copyboard is sturdily constructed and is capable of holding steel sheets weighing in excess of 200 lb. Vacuum, which holds the copy in place, is controlled by four valves on the back of the copyboard. By the use of these valves and masking curtains, copy can be accommodated in any position on the board. The face of the copyboard has a white finish so that translucent paper and glass cloth drawings can be copied.

The rear case assembly includes both a vacuum



This view of the template camera also shows the back of the copyboard. The periscope enables the operator to watch dial readings while controlling position of the board. Two vacuum lines are attached to the panel on which four controls are located.



Copy is held firmly on the board by vacuum. Four controls on the reverse side enable the operator to place copy in any position on the board.

film holder and a set of self-centering, motor-driven plate bars. Movement of the plate bars and vacuum for the film holder are both controlled by foot switches, so the operator's hands are free to either load film or glass plates. The vacuum film plane will hold film from eight in. by 10 in. to 42 in. by 52 in Control is by a single selector dial.

The maximum bellows extension is 144 in. The bellows is made in four sections which can be easily removed.

The camera can reproduce drawings with deviations of less than 0.002 in. in 12 ft. When doing work requiring high accuracy, a photographic dry plate is used. This plate is on 0.190 in. glass which is shot at $\frac{1}{4}$ scale. Making the negative to $\frac{1}{4}$ scale offers some

distinct advantages. It is small enough to handle through the developing process with ease, yet large enough to capture the finest detail of the original.

When the negative is made, a readingon a dial indicator system allows the operator to record the exact position of both lens board assembly and copyboard. This feature makes it possible to return the camera to the same position exactly. The dial indicators can be read to 0.001 in., and readings are generally recorded on the negative.

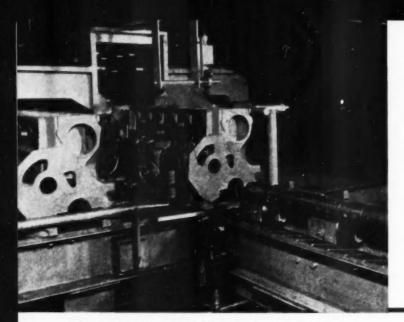
The versatility of the camera and its equipment makes it possible to do precision work required when models of aircraft are made. The drawing and lofting can be done in any scale desired and, by using the camera, the model can be built to different scales without redrawing the master, thus saving time.

Full size reproduction of airframe structure for mockup work is also done on one in, thick plywood. This saves considerable time and also provides a mockup to very close tolerances. After the plywood reproductions are cut out and assembled, the remaining photographic image helps engineers to find points of interference and offers them a study of their actual design.

Reproductions that are made purposely to a given point oversize for plaster patterns are called shrink reproductions. They are made just enough oversize to allow for the shrinkage of the molten metal when it cools. Prior to having a camera available for this purpose, it was necessary to make two drawings. One of these was drawn full size and the other was drawn to shrink scale. Only the full size layout is now made, since the camera can make any shrink scale from one layout.

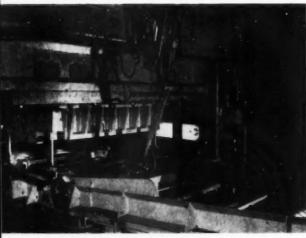
When work is subcontracted to other firms, the camera plays an important role in the transfer of working information to vendors as well as to Convair's other divisions. An accurate reproduction is a very important factor in a successful subcontracting program.

Small scale models of buildings and machines can be photographically superimposed on plant layout drawings with the new equipment. The camera can handle continuous tone reproductions as well as line work. Large wall charts and photo murals can easily be made, not only to any size, but to the tolerances required. The camera is also being used for production of silk screens, multilith plates, nameplates, aluminum cals, negatives for blueprint and ozalid reproductions, and all types of photographic paper prints.



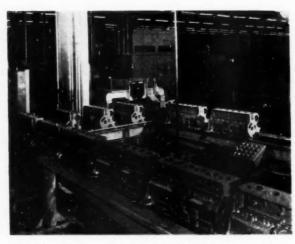
Automation at FORD

Reciprocating automation shuttle bar shown in foreground is equipped with pawis which extract and transfer six-cyi engine block to next machining operation. By this unique air-powered and electrically-controlled equipment the 180-lb engine block casting is moved automatically on grooved ways to succeeding machining operations. Block on left is being moved on "broadside shuttle" to dual machines used to complete next series of operations.



Iron hand automation device extracts sections of floorpan panel from draw press at the Buffalo stamping plant. Automatic extractor drops panel on indexing chain conveyor (right foreground) which moves panel to automatic loader of next press in timed sequence. Loading, extracting and transfer are made automatic by means of automation devices and special conveyors. This "Iron hand" is a simplified version of earlier models of automatic press extractors, but it also is likely to be suspended by the new horizontally mounted types.





This view of the rear end of a 96-ft broaching machine which weighs 140,000 lb, shows engine blocks being automatically ejected upon automation transfer equipment. At this point, automation shuttle transfers (both broadside and lengthwise) selectively divide the blocks into two separate lines and automatically feeds them to two succeeding identical machines.

This 14-station transfer machine is an excellent example of advancement made toward reduction of manual handling and number of individual machines required to do the same amount of work. Drilling, reaming, countersinking, spot-facing, and tapping of bolt holes in top and bottom faces of the six-cyl overhead valve engine block are machining operations performed on this new transfer machine. It has 176 spindles in operation on the block.

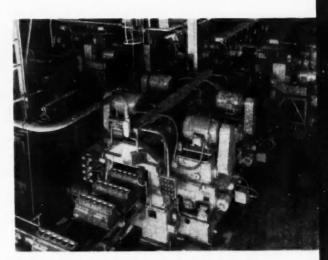
PRESENTED here are some selected illustrations of equipment for the automatic handling of cylinder blocks at Ford's Cleveland Engine Plant and sheet metal parts at the Buffalo Stamping Plant. The Cleveland plant was described in AUTOMOTIVE INDUSTRIES, July 1, 1952, page 44, and April 1, 1953, page 64; the Buffalo plant in the November 15, 1952, issue, page 34.



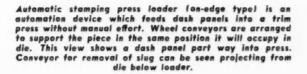
Ford passengar-car roof stamping has been removed automatically from dies of huge press by the iron hand, shown attached to rail in foreground. The mechanical extraction hand has placed the stamping on an automatic turn-over device. This automation device will turn the place over and place it in proper position for the following trim operation.

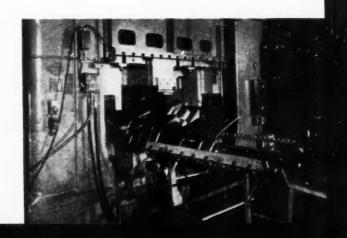


This overhead view shows a variety of automation devices serving the cylinder block machining lines. Lengthwise shuttles, broadside shuttles and an automatic turntable are shown performing automatic transfer movements through various machining units. The automatic turntable Ishown behind guardl is used to position block for the lengthwise shuttle. At the extreme right an overhead shuttle is shown.



Engine-block castings are fed by automation into these transfer machines. Section in foreground is a five-station machine that mills both ends of block. In the back ground is a 30-station machine that performs a series of milling, drilling, chamfering and tapped operations.







11) Source Gran Turismo 42 passenger bus. Its six-cyl Diesel is rated at 150 hp, and top speed is said to be 55 mph.

Commercial Vehicle Industry in Austria Has Slow Growth

The postwar decision to stop making passenger cars in Austria has led to an expanded output of commercial vehicles during the past few years. While the annual figure for trucks and buses as yet comes only to a few thousand, production has risen steadily during recent years and in 1952 was nearly double the 1937 level. Despite the relatively small total output, about one quarter of the vehicles are being sold abroad, and plans are being made for stepping up these exports.

Of the three principal producers - Osterreichische Saurerwerke, Steyr, and Gräf & Stift - the first accounts for both the widest range and the greatest number of vehicles. Saurer is now making some 20 types of trucks rated from 31/2 to nine tons, and 10 varieties of buses and coaches seating 29 to 60 passengers. For all these, however, there are only a half dozen different chassis and three engines.

The engines are four stroke Diesels of four, six and eight cylinders rated

By David Scott

at 90, 130 and 180 hp at 2000 rpm respectively. All are of the same construction, 4 5/16 in. bore by 51/2 in. stroke, using common parts extensively. The six cyl unit is found most frequently. With a piston displacement of 488 cu in. and compression ratio of 18 to 1, its dry weight is 1350 lb and power output 10.3 lb per hp. It features integrally - cast crankcase and cylinder block, wet liners, seven-bearing crankshaft, individual cylinder heads, and diagonally split connecting rod caps for upward withdrawal of pis-

Timing gears are at the rear, and the oil pump is driven directly by the crankshaft. The oil pressure valve is easily acces-

sible, facilitating external adjustments. Transmission consists of single plate clutch, five-speed gearbox with overdrive, automatic gear lock, and constant mesh in the three top speeds. Output of this engine may be raised to 150 hp by fitting a turbo-supercharger, improving the weight-to-power figure to 9.2 lb per hp.

The supercharged engine is used in one of the newest Saurer coaches, the Gran Turismo. This is built (Turn to page 84, please)



13) Saurer Model 6GF-L four-ton dump truck powered by four-cyl, 90-hp Diesel.



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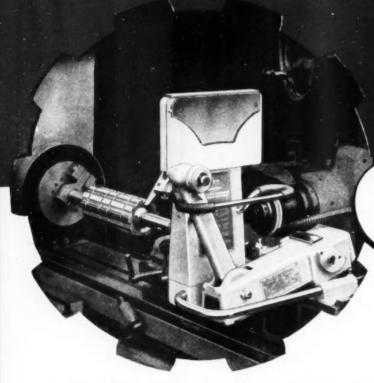


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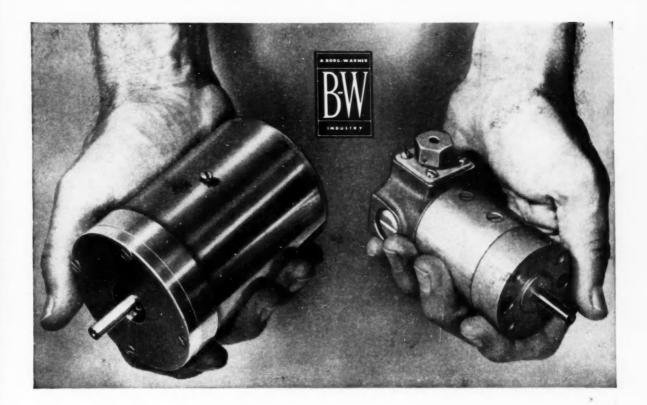
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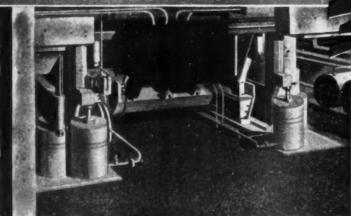
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One of five buge body presses at Ford Motor Company's Buffalo Stamping Plant with 500-borsepower Reliance adjustable-speed press drive motor.



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News of the MACHINERY INDUSTRIES

By Thomas Mac New

Permanent Machine
Tool Show To Feature
Wide Variety of Exhibits from Many
Countries. Slight Drop
in Machine Tool
Orders.

Unique Tool Exhibition

On October 5th, a permanent machine tool show will open in Brooklyn, N. Y. Machine tool builders from all over the world have been invited to participate and demonstrate their various products. When the First International Machine Tool Exposition opens, it will be the first time that such a wide diversification of tools from many different countries will be assembled as a permanent exhibit.

After visiting the building that will house the show, we were impressed with the number of machine tools being shipped in for the exhibition. Tools were being set up from the United States, France, Italy, Austria, England, and Germany. Of the equipment already on the floor, there were probably more machine tools from Italy than from any other country. The U. S. had three manufacturers represented up to this time. We were assured that there would be other U. S. manufacturers represented by the time the show opens.

According to the sponsors of the exhibition, the S & S Machinery Co., the display will include approximately 1000 machine tools, including production, tool room, and metal fabricating equipment. We noticed tools ranging from a huge European horizontal boring mill down to a small American - made bench - type drill press.

Largest Universal Testing Machine

According to the Baldwin-Lima-Hamilton Corp., an order has been placed for the largest universal testing machine ever built. Delivery of the new hydraulic machine is slated for February, 1955.

Although the machine will be the third testing machine of 5 million lb capacity built by Baldwin for tests in tension, compression, and flexure, its height of 57 ft is eight ft more than the next largest and 10 ft more than the first machine of this capacity. The Bureau of Reclamation

has the next largest and the Naval Air Material Center in Philadelphia has the 47 ft machine. For compression tests only, the National Bureau of Standards has had for many years a testing machine of 10 million lb capacity. The increased height of the new machine will provide for tests of specimens at least 25 per cent and 33 per cent greater in height respectively than is possible in the two previously built universal machines.

Clear space in the machine for tests in either tension or compression is 40 ft vertically and 10 ft between columns. Structural provisions for transverse testing are to be built into and under the floor of the laboratory at Lehigh University where the machine will be housed. This will enable the testing of structures up to 40 ft long through the opening of the machine.

Orders Declining

New orders for machine tools showed a drop of about 10 per cent during July, totaling approximately \$73 million. According to the National Machine Tool Builders Association, the new order index for July stood at 264.8, a drop from 273.4 in June and far below the 376.3 index figure of July, 1952. Shipments also declined, largely because of vacations at machine tool builders' plants. Shipments are estimated to be down about 23 per cent. The index figure for shipments dropped to 267.7 from 342.2 in June but still was above the 259.7 figure of July, 1952.

Industry estimates that new business for the remainder of the year probably will not be higher than \$75 million in any month but that the year still will be very satisfactory. A factor that is likely to influence new orders in the coming months is the General Motors Hydra-Matic plant fire which should account for considerable ordering of new machines.

Patents Opened

Westinghouse Electric Corp. has recently opened 231 patents to the public for unrestricted use. A number of the patents deal with such products as transformers, amplifiers, resistors, rectifiers, circuit breakers, and electric furnaces. Most of the patents in the group apply to the electronics field.

In addition to those named are patents connected with electric control systems for motors, are welding machines and electric locomotives, as well as drill presses, milling machines, and other machine tools.

Conveyors Important to Ovens

Conveyor equipment which once was an incidental in oven manufacture is now often of equal importance to the oven itself, according to the Michigan Oven Co. of Detroit. As an example, a recent installation for one of the leading automobile makers conveys and rotates car heater motors while they are passing through waterwash booths and also bakes the finish. All conveyor equipment was designed and supplied by the oven maker.

Gear Ratio Down

Gearing volume for the industry, as reported by the American Gear Manufacturers Association, dropped 17.5 per cent in July as compared with June, 1953. The index figure for July is computed to be 120.7.

Around the Industry

A vacuum furnace for annealing tubing of titanium and zirconium is being installed at the Norristown, Pa., plant of Superior Tube Co. The new furnace is the batch type and can handle tubing in lengths up to 24 ft.

Kurt Orban Co., Inc., has moved its Detroit office and service center to larger quarters. Over \$75,000 worth of German machine tools—lathes, milling machines, grinders, turret lathes and shapers—have been installed for demonstration and for training plant personnel from the area in the use of the equipment.

Hufford Machine Works, Inc., El (Turn to page 161, please)



FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 73

Semi-Automatic Machine Processes Variety of Oil Pans

A semi-automatic, special purpose machine for processing welded steel oil pans for large Diesel engines has been placed in production. The parts made are in four-sizes—V-6, V-8, V-12, and V-16, and the operations are boring and facing hand hole openings in each cylinder center line.

The machine consists of a welded steel base 267 in, long and 120 in, wide. The rear section of this base carries a fixture centered on a turntable which swings the fixture through a 180 deg arc during the work cycle. Immediately in front of this is mounted a hydraulically operated feed unit, moving upon rails running the full length of the base. This unit is indexed from station to station by a fluid motor driving a pinion which engages a rack attached to the base.

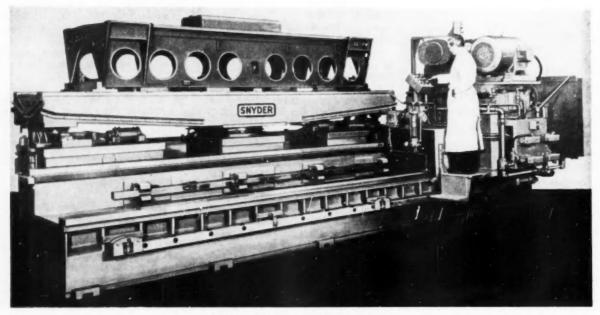
Operation starts with the part loaded into the fixture and manually clamped. With the carriage at the left hand end of the ways, the operator presses a cut button and the hydraulic feed unit goes through its sequence consisting of rapid advance, feed for boring, feed for facing, and rapid return.

The operator has choice of automatic or manual operation. On automatic operation, the carriage bearing the unit automatically indexes to each successive work position and the feed unit goes through its cycle until all holes on one side of the part are bored and faced. The carriage then indexes to the extreme right, the operator presses a button which causes the fixture to rotate 180 deg bringing the opposite side of the part into position for processing. Pressing the cycle

button again causes the carriage to move left to the nearest work station where the unit goes through its cutting cycle and is indexed to each successive station until the work cycle is completed. The unit is then back at the left end of the machine and the part is unloaded. Dogs for control of unit carriage index are mounted on a rotating dograil between the rails on the base.

The hydraulic power unit for carriage traverse and head operation is mounted on the moving carriage and a separate hydraulic unit rotates the fixture. A maximum of 16 stations may be used. Coolant is pumped from a tank built into the base. Lubrication is from two centralized systems operated by hand. Carbide tools are used. Snyder Tool & Engineering Co.

Circle 66 on page 73 for more data



Snyder special purpose machine for oil pans.

Automated Underpass Gear Shaver Features High Production

An automation equipped underpass gear shaver is now available. One shaved helical shoulder gear every 15 sec is the pace maintained by this conveyorized set up with fully automatic operation.

The basic machine is a Model 870 underpass gear shaver tooled up for fully automatic operation. All the operator has to do is load the hopper; the rest of the cycle, including pre-inspection of gears, is automatic.

A sizing fixture at the hopper mouth rejects oversize gears, thus providing automatic quality control through the operation.

Gears move down the trough by gravity until they reach loading position. Here an air cylinder takes over and feeds the gears into shaving position, one at a time. The shoulder of the incoming gear pushes against the shoulder of the shaved gear, causing the latter to eject at the completion of the shaving cycle. The gear teeth themselves never touch, so there isn't any possibility of damage to the finished gear.

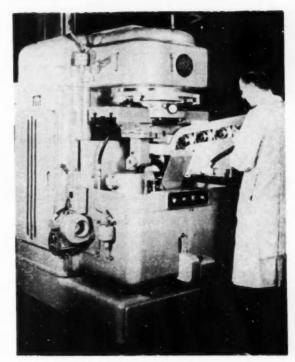
An air-operated expanding mandrel clamps the incoming gear and holds it during underpass shaving.

Positioning of the gears is apparently so positive that a safety device, provided for automatically ejecting any gear not properly aligned with cutters, has not come into operation at any time during production test runs. Release at the end of the machine cycle is automatic. The 27-tooth helical gears have a 2.0257-in. P.D. with a 0.734-in. face width. Normal pressure angle is 18°30′ with a 17° 49′6″ left hand helix angle.

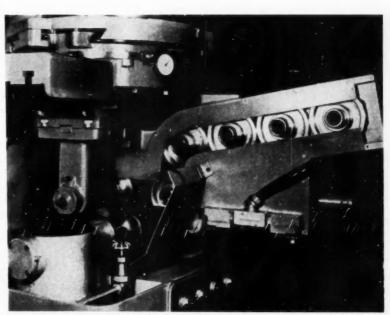
The ejected gear rolls down a trough at the back of the machine and lays over gently, flange down, on a wire mesh conveyor used to transfer the gear to the next operation. A short guide rail extending beyond the end of the exit trough and the weight of the flange combine to position each gear perfectly on the conveyor. The completed gears move down the length of the wire mesh conveyor and empty onto a parts table to complete the operation.

Should the automation-equipped machine be needed for shaving other gears, it may be converted to standard operation by removing the automatic loading mechanism and controls. Michigan Tool Co.

Circle 67 on page 73 for more data (Turn to next page, please)



Michigan Model 870 underpass gear shaver equipped for automatic processing.



Gears are loaded manually into the hopper, which contains a sizing fixture for control, and the remainder of the cycle is fully automatic.



For additional information, please use postage-free reply card on page 73

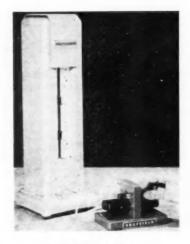
(Continued from page 65)

Air Gage for Testing Cylindrical Parts

Accurate and rapid inspection of cylindrical parts such as automotive piston pins for outside diameter, cloverleaf, and taper, etc., is being done on a recently designed air gage. A feature that makes it virtually wear-proof includes two cylindrical steel guide rails on each side of the air ring which can be revolved when the sliding surfaces are worn. Instead of scrapping the gage or reworking the guide rails the operator turns the rails slightly and gets new locating surfaces of the proper size.

With this gage, the operator lays the pin on the two steel cylindrical guide rails and pushes it through the air ring. Instantly, the position of the float in the Precisionaire column indicates whether or not the pin is within dimensional tolerance.

This air ring has three open type air jets spaced 120 deg apart. When connected to a Precisionaire having a 10,000 to 1 amplification a variation in diameter of 0.0003 will cause the float to move three in. in the Precisionaire column. A variation in di-

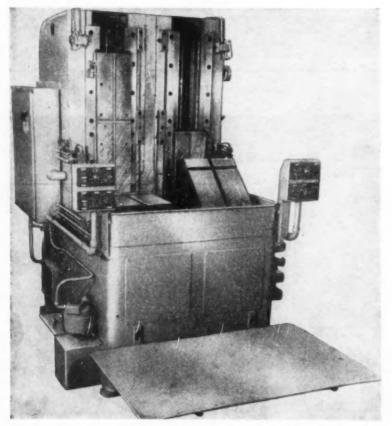


Latest Sheffield air gage.

ameter of as little as fifty millionths moves the float half an inch.

Air ring gages can be had with amplifications of 1000 to 1, 2000 to 1, 5000 to 1, and 10,000 to 1, depending upon part tolerance. Other types and amplifications are made to the purchaser's specifications. The Sheffield Corn.

Circle 68 on page 73 for more data



American Model SBD-30-4 broach.

Broaching Machine for Small Parts

This standard Model SBD-30-4 (30 in. stroke, four-ton capacity) dual ram surface broaching machine is a new size that has been added to a standard line of surface broaching machines. The relatively short stroke and light tonnage of this broaching machine are claimed to make it ideal for the surface broaching of small parts at a high rate of production. Tilting work tables are claimed to provide convenient loading positions for parts. The machine can be set at either an automatic or semiautomatic cycle. All electrical and hydraulic circuits conform to Joint Industry Conference Standards. American Broach & Machine Co.

Circle 69 on page 73 for more data

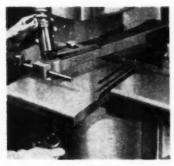
Fabricator Performs Varied Operations on Sheet Metal

Model 10-AA sheet metal fabricator, which punches, notches and nibbles, is now available to the trade. This model with improved Hydra-New-Matic head is said to operate with a minimum of vibration and noise at 165 strokes per min for single hole punching and for nibbling.

Rapid interchangeability for punching, notching and nibbling is allegedly







Illustrating the interchanging of punches and dies for various size hole diameters up to 11/4 in.

one of the outstanding features of the fabricator. The 1¼ holder which incorporates the "Quick Change" system is claimed to permit 10-sec changing of punches and dies for punching various round and shaped holes up to 1¼ in. diam.

A 31/2 holder provides for punching various round and shaped holes up to

3½ in. diam, and requires the interchanging of three parts—punch tip, stripping plate and die.

Adjustable back and side gages on both 1¼ in. and 3½ in. holders provide hole locations.

By placing an independent, selfcontained notching unit on the fabricator bed table, notching operations can be performed without ram adjustments. Notching units are equipped with built-in scales and gages adjustable up to five in. for corner notches.

A nibble lever controls the non-repeat device for continuous, uninterrupted ram operation while nibbling. Wales-Strippit Corp.

Circle 70 on page 73 for more data

Electrically Operated Unit Checks Internal Threads

A bench model Rotochek, an electrically-operated gage for checking internal threads by power instead of by manual rotation, has recently been placed in production. The bench model has the gaging assembly mounted directly on the motor unit. Transfer of the entire unit from one location to another is facilitated by its light-

weight construction and a convenient handle directly above the motor.

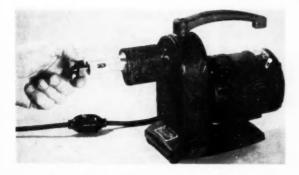
A slight forward pressure of the workpiece causes the gaging member to screw into the part automatically at the rate of four revolutions per second. Reversal of applied pressure causes immediate disengagement or reversal of the drive, as desired.

Torque control is provided by a novel clutch design, in order to eliminate any danger of damaging the parts inspected.

The standard spindle will accommodate A.G.D. tapers No. 00, No. 0, No. 1, and No. 2, covering a range of thread gages up to 0.510 in. nominal diameter. A slightly larger spindle assembly can be furnished to extend this range to include A. G. D. No. 3 tapers. Special adapters are also available for reversible thread plug members, and for adapting the Rotochek to inspection of externally threaded parts.

The rapid gaging speed and ease of operation of the Rotochek are claimed to permit inspection time to be reduced by as much as 75 per cent. Taft-Peirce Mfg. Co.

Circle 71 on page 73 for more data (Turn to next page, please)



Taft-Peirce bench



For additional information, please use postage-free reply card on page 73

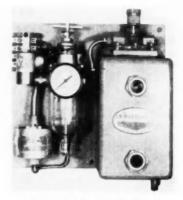
(Continued from page 67)

Automatic Oiling System

A fully automatic oiling system for plain bearings, ball and roller bearings, vees, slides, ways, rollers, cams, chains, gears and transmissions has been placed on the market. Identified by the trade name "Oil-Air," it applies a constant and uniform oil film to groups of bearings. It operates solely on compressed air.

"Oil-Air" atomizes oil into microscopic particles which are carried in the airstream and distributed through

tubing to the bearings. It circulates oil and air within and throughout the bearing cavities. Compressed air enters the unit at 100 psi and is reduced to 10 psi. As the oil passes through the venturi, it draws the oil from the reservoir. Amount of oil flow is adjustable. The mixture of oil and air is thrust against a reclassifier which reduces it to minute drops of oil which in turn lubricate the bearings, according to the maker.



Fauver Oil Air lubrication system.

An "Oil-Air" system consists of solenoid valve, filter, water separator, regulating valve, lubricator, reservoir, pressure switch and low-level indicator. "Oil-Air" lubrication systems can be installed to deliver lubrication at any point in three forms: (1) compietely atomized, (2) spray form and (3) reconverted to liquid oil. J. N. Fauver Co., Inc.

Circle 72 on page 73 for more data

Grinder Features Tilt-Head and Refrigerated Surface Plate

A novel improvement in grinders that allegedly increases production has just been developed.

The two outstanding features of

this new grinder are as follows: First, a table which stays horizonta!, while

The second feature is a refriger-

Sierra tilt-head grinder.

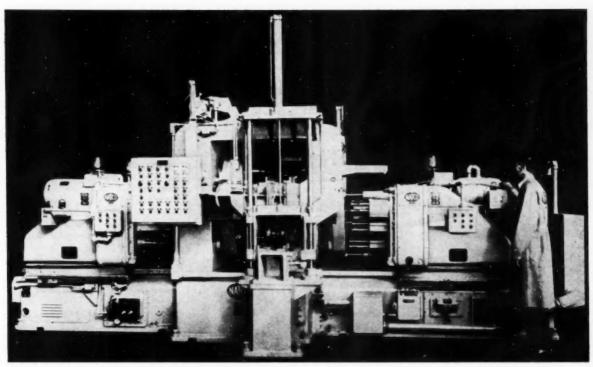
the grinder tilts to 30 deg open or 30 deg closed grinding position. The tilt angle of the grinding belt can be changed during the grinding operation through knee-pad controls. The grinding machine, in addition to continuous change of tilt, has an autostop device which permits change of tilt in graduations of 1/2 deg for each press of the knee-pad control.

ated surface plate to keep the material cool while grinding. About 210 sq ft of surface enable the operator to keep his material in an easily handled temperature range.

An exhaust system acts within the belt grinder to pull all grit into a Dust-Kop or container unit.

The machine is gear driven and small, having a height of 36 or 37 in., a width of 34 in. and a length of 72 in. A five hp motor drives the grinding belt at a surface speed of 4500 fpm. The machine is completely lighted and wired for 440 w. Sierra Machinery Co., Inc.

Circle 73 on page 73 for more data



NATCO machine for tractor track rollers.

Automation Increases Machine Production of Tractor Parts

A two-way Holesteel machine has been developed for complete automation and flexibility in the loading, drilling, countersinking, tapping, and unloading of tractor track rollers.

In this machine provision is made to handle any of three sizes of rollers without changing set-up and without touching the parts by hand. Also, the machine handles either right or left hand parts in each of the three sizes.

As can be noted from the illustra-

tion, the part is rolled on a track into preload position at the front of the machine and then elevated automatically to a higher level which places the part in position for rolling into position opposite one of three arbors which then clamp the part automatically into the trunnion fixture.

From this loading position the machine automatically indexes and carries the part into a second position for drilling and countersinking both ends of the part. The machine again indexes automatically and the part is in position for tapping of both ends of the part.

After the third index, the part is in unloading position and automatically unclamped and rolled on a track out of the machine. Only one of each of three sizes of tractor track roller is machined at one time. Production is 72 parts per hour. National Automatic Tool Co., Inc.

Circle 74 on page 73 for more data

High-Low Temperature Test Unit

A "hot-cold" unit designed for high and low temperature testing is available in capacities from one to four cu ft. The unit will operate at temperatures from 250 deg above zero to 130 deg below zero.

Manual or automatic control of temperature can be provided. For automatic operation, either a motor driven timing relay or an integral cam controller is available.

To reach the low temperature, a standard Heat Sponge design is used. This assures speedy temperature pulldown where required, it was pointed out by the manufacturer. Actual pulldown time can vary to fit the user's requirements.

For the high temperature cycle, an automatically controlled, water-proof, explosion-proof heater is used.

The test chamber of the unit is equipped with a fan for controlled air flow and uniform temperature distribution. A temperature recorder is also provided.

Primarily the high-low temperature test cabinet circuits are being built into the Series V-120 units. The overall compactness of these vertical models and the floor space they occupy—7.5 sq ft—in relation to chilling chamber size, make them suited to laboratory and testing needs. The manufacturer notes, however, that the same basic temperature circuits can be adapted to units with chilling chambers of any size, and in any temperature range. Sub-Zero Products Co.

Circle 75 on page 73 for more data (Turn to next page, please)



For additional information, please use postage-free reply card on page 73

(Continued from page 69)

Industrial Magnet For Sheet Metal

A sheet fanner magnet, that can be utilized in the metal-working market has been brought out.

The sheet fanner magnet performs the following operations: separate oily sheets, lift polished or painted sheets, prevent double feed, provide safety for operators, handle irregular or odd shapes.

This magnet is available in four strengths and three sizes—six in., nine in. and 12 in.—depending upon the individual application, and will handle light sheets from 22 gage up to ¼ in. plates.

Alnico V plate magnets are mounted on an aluminum L bracket so that the pole plates and air gap are vertical. Stainless steel anti-friction guides positioned on the face of the L bracket

accommodate sheets as small as four in. wide. These two narrow ½ in. by ½ in. strips extending along the face of the units decrease frictional resistance to the elevation of sheets from a pile and removal of sheets from the face of the magnetic assembly.

An exclusive feature of the fanner is the completely sealed casting. This enclosure prevents tampering and accumulation of iron on backs of castings with consequent magnetic loss.

Some applications call for fanner magnets on both sides of a pile or at each corner of large sheets. Sheets being handled do not become permanently magnetized unless they are of medium or high carbon content. Eriez Mfg. Co.

Circle 76 on page 73 for more data



Eries sheet fanner magnet.

Cleveland straight sided double crank press.

Straight Sided Double Crank Press

Now on the market is a straight sided double crank press, double geared, twin drive equipped with two station electrically controlled air operated drum type clutch with spring loaded brake. The press is designed with air counterbalance to the slide, and the flywheel is provided with an auxiliary air brake to bring it to a quick stop when the power is shut off.

Bed of the press is arranged with a 91 ton pneumatic cushion in two units, with air manifold controls, so that cushions may be operated independently of each other. It has a stroke of 16 in., 12 in. adjustment to the slide, 32 in. distance bed to slide, stroke up and adjustment down, 60 in. by 96 in. bed and slide area, and has a capacity of 525 tons. The gears run in a bath of oil and the drive is by multiple vee belt from motor to flywheel. Cleveland Punch and Shear Works.

Circle 77 on page 73 for more data

PRODUCTS.

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 73

Toggle Switches Have Molded-In Receptacles

Recently introduced are two series of waterproof toggle switches designated as Type ACM. They feature a molded-in female waterproof connector receptacle, designed for assembly with male waterproof plugs. It is claimed that this eliminates the need for vulcanizing leads to the switch.

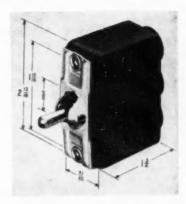
The switches are said to be completely waterproof, operate satisfactorily from -65 F to 160 F, and withstand severe shock and vibration. Series 29-ACM (see cut) is a flushmounting switch, with capacities on

resistance type load of 25 amp at 24 v d-c and 15 amp at 125 v a-c.

Series 19-ACM is one-hole mounted with a waterproof barrel that reportedly eliminates need for a seal nut or outside panel seal. Capacity on resistance type load is 25 amp at 24 v d-c and 11 amp at 125 v a-c.

Each switch is available either spst or spdt, in eight different toggle arrangements, with or without a center "OFF" position. Riverside Manufacturing and Electrical Supply Co.

Circle 31 on page 73 for more data



Push-Button Parking Machine

Known as the Sky-Park, a push-button machine that is said to store cars in the air has been announced. There are two models of the new machine one doubling and the other tripling parking accommodations in existing parking areas.

Both models of the machine have a rigid central column which is attached to a steel base. In each instance, two car platforms are attached to either side of the column, and, after a car is driven on a platform, both the car and platform are raised over six ft into the air. This permits cars to be placed underneath the elevated cars.

Either model of the push-button machine may be operated mechanically or by hydraulic compression. Once a car is lifted into the air, a safety device catches and holds it in place. There is also a bell attachment that rings when a car is being elevated or lowered. Simmons Industries, Inc.

Circle 32 on page 73 for more data

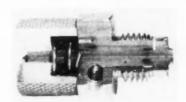


Bleeder Valve for Hydraulic and Pneumatic Lines

Said to be designed for both hydraulic and pneumatic lines of any size or pressure is a semi-automatic bleeder valve. It is a spring-loaded, rotary-type unit using a knife-edged cap that uncovers the bleed port with a twist of the external head.

An internal spring snaps the valve closed when the head is released, and the bleed-port cap shears off and cleans out any entrainment caught at the bleed opening for a positive closure and seal, Greer Hydraulics, Inc.

Circle 33 on page 73 for more data



Self-Closing Magnetic Oil Drain Unit

Currently offered to improve inspection and service check-ups on industrial equipment, engines, and other machinery using oil as a lubricant is a magnetic oil drain unit.

The product reportedly will attract and retain chips and particles of steel that may be contained in the lubricant. A special valve built into the body of the plug closes automatically when magnet is removed for inspection. Technical Development Co.

Circle 34 on page 73 for more data (Turn to page 72, please)



NEW PRODUCTS

For additional information, please use postage-free reply card on page 73

(Continued from page 71)

Utility Heaters

Newly developed is a line of utility heaters for mobile units and small space heating. They are said to be precision-built for use with 35 psi hot water or five psi steam systems.

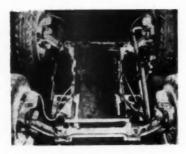
The heaters for mobile units are available with or without defroster equipment, and are furnished with mounting brackets. They may be free-standing, wall-hung, or flushmounted, according to the maker.



Attractive cabinets house the heating cores, which are composed of copper fins and brass tubes and tanks. Fully enclosed dustproof motors are said to provide maximum heat flow.

Adjustable louvers, guard screens, defroster booster motors, heavy gage, die-formed casing, damper control knobs, and easily accessible fans, are other design features. Young Radiator Co.

Circle 35 on page 73 for more data



Second Front Truck Axle

Now on the market is an additional steering axle for coupling to the standard front axle of a truck by a walking beam. The result is a tandem bogie that is said to steer all front wheels with center poise steering.

The axle, besides enabling the truck to carry additional payload weight, is also said to provide a more economic and safer use of existing highways. Better weight distribution not only means less wear and tear on roads but also results in fewer units to haul a given tonnage, according to the maker. Chain Belt Co.

Circle 36 on page 73 for more data

Plastic Sheet Material

Recently developed is a rigid plastic sheet material that is said to have unusual properties and good low-cost forming characteristics. The material, known as Campco S-300, is a copolymer of polystyrene and rubber extruded through special equipment to produce, in a single operation, a material with a smooth surface and a high gloss finish.

It can be supplied in any desired length in widths ranging from 26 to 58 in., and in thicknesses ranging from 0.005 to 0.125 in. Color range is unlimited, according to the manufacturer.

The combination of styrene and rubber reportedly produces a sheet that has high impact strength without sacrifice of formability. In addition, the sheet is said to machine easily and to be dimensionally stable, since its water absorption is low. It is claimed that forming is simple, as no heavy presses, machines, or expensive dies are required. The sheet is usually heated to a predetermined temperature, then snapped into final shape by applying vacuum through a low-cost die. Campco Div., Chicago Molded Products Corp.

Circle 37 on page 73 for more data

Truing-Balancing Machine

Recently introduced is a precision truing and balancing machine, known as the Balantru, for eliminating the high spots and balancing new or used tires in one operation.

The machine is said to permit the operator to mount the wheel and drum or wheel alone and then true the tire and balance the wheel assembly without having to dismount the unit. The entire operation on an average wheel reportedly takes only a few minutes.

The unit is available in heavy-duty models for trucks and passenger cars, or in a model for passenger cars only. Bear Manufacturing Co.

Circle 38 on page 73 for more data



Stud Wrench

Recently announced is a stud wrench for industrial and automotive applications which is said to combine large capacity, speed, and positive operation with economy. Ratchet action is built in.

The self-contained tool in two sizes reportedly handles any O.D. from ¼ in. through ¾ in., regardless of contour. SW-1, with capacity through ½ in., takes either internal ½ in. square, or external one in. hex drive.

SW-2 takes 1¼ in. external hex drive and is hollow to accommodate any length stud. Its capacity is 17/32 in. to ¾ in., inclusive. Clark-Feather Mfg. Co.

Circle 39 on page 73 for more data (Turn to page 187, please)

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRO-DUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mall Promptly for Quicker Service.

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FREE LITERATURE

Crane Truck

Recently released is a folder on an electric - powered, two - wheel drive crane truck. The unit, Type CX-4, has four-wheel steer, and overall length of 133 in., width of 63 in., and height of 761/2 in. The crane has a capacity of 6000 lb at seven-ft radius. Elwell-Parker Electric Co.

Circle 1 on postcard for free copy

Dry-Type Transformers

Bulletin EU-106, No. 12 describes a line of dry-type distribution transformers. The units covered are Class B insulated 80 C rise dry-type transformers, in ratings three through 100 kva, single-phase, 600 v and below. Electrical Div., Wagner Electric Corp.

Circle 2 on pestcard for free copy

Milling Machines

Recently released is a booklet which describes and illustrates some typical uses of vertical rotary Rigidmil milling machines. Sundstrand Machine Tool Co.

Circle 3 on postcard for free copy

High-Tensile Steel

Fresh off the press is a 26-page booklet on Jalten high-tensile, lowalloy steel. Its properties, uses, and adaptations for various needs are covered. Jones & Laughlin Steel Corp.

Circle 4 on postcard for free copy

Problem Solvers

Now available is a booklet on a number of unique devices that have been used to solve operational headaches and safety problems in the oil and chemical fields, but which are deemed to be applicable to other industries. Petroloum Chemicals Div., E. I. du Pont de Nemours & Co., Inc.

Circle 5 on postcard for free copy

Fiber Glass Insulation

Fresh off the press is a folder covering the insulation of trucks and trailers with fiber glass. Tables showing sound absorption data, thermal conductivity curves, and standard product data are given. Fiber Glass Div., Libbey-Owens-Ford Glass Co.

Circle 6 on postcard for free copy

Tin Activities

The latest issue of "Tin News" reviews recent developments in the world tin market and their economic influences. The Malayan Tin Bureau.

Circle 7 on posteard for free copy

Manual Indicators

Catalog ND42 describes how manually-operated portable and panel indicators are being used to measure temperature, electrolytic conductivity, or pH. Leeds & Northrup Co.

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Silicone Rubber Items

Bulletin AD-147 describes a line of rubber products. They include: dia-phragms, gasketing, sheet packing, oil seals, rings, insulation tape, rod and valve stem packings, and molded shapes for many industrial uses. The Garlock Packing Co.

Circle 9 on posteard for free copy

Tubing Stress Values

Known as TDC 154, a data card now available tabulates the maximum allowable stress values (S values) of a complete range of seamless and welded carbon, alloy, and stainless steel tubing and pipe. Tubular Products Div., The Babcock & Wilcox Co.

Circle 16 on postcard for free copy

Tool Power Source

Now available is a bulletin describing a power-source for operating drills and cutting tools. Drillunit, Inc.

Circle 11 on postoard for free copy

Gasoline Engines

Bulletin L-7696 covers a line of gasoline engines for stationary, automotive, and marine applications. Fageol Products Div., Twin Coach Co.

Circle 12 on postcard for free copy

Screw Machines

Vol. 39, No. 9 of "Lubrication" has a feature article on automatic screw machines. The Texas Co.

Circle 13 on pestcard for free capy

USE THIS POSTCARD

Humidity Testing Units

Recently issued is a four-page bulletin covaring H-Series relative humidity testing units. Boweer Technical Refrigeration Div., Bowser, Inc.

Circle 14 on protesrd for free copy

Metallurgy

Vol. 14, No. 4 of "Engineering Forum" is devoted to a feature article on organizing metallurgical control. Eaton Manufacturing Co.

Circle 15 on posteard for free copy

Press Renewal

Bulletin No. 45 covers 42 standard modernization and conversion assemblies that have been developed to restore full operating efficiency to old presses built by the manufacturer. E. W. Bliss Co.

Circle 16 on postcard for free copy

Parking Garages

Recently released is a booklet entitled "Auto Parking" which discusses the use of vertical parking garages as a solution to this problem. Charles W. Lorch & Associates.

Circle 17 on postcard for free copy

Buttwelding Machines

Recently released is a brochure describing semi-automatic buttwelding machines for fabricating sheet metal into smooth cylinders and joining flat strips and sheets. Contracts Div., Solar Aircraft Co.

Circle 18 on postcard for free copy

Titanium Grinding

Vol. 10, No. 2 or "Report" has a feature article on grinding titanium and its alloys. The Cincinnati Milling Machine Co.

Circle 19 on posteard for free copy

Heat Calculator

Now available is a heat exchanger calculator for use in the selection of shell-and-tube type heat exchangers produced by the manufacturer. Young Radiator Co.

Circle 20 on postcard for free copy

Aircraft Generators

Recently released are two bulletins on aircraft generator systems. The first (GEA-5906) is on a 28-v, d-e system, while the second (GEA-5905A) covers an a-c type. Apparatus Dept., General Electric Co.

Circle II on posteard for free copy

Industrial Filters

Fresh off the press is an eight-page bulletin on Delpark industrial filters. Major features are complete dimensions and capacities of the various units available for industrial applications. Industrial Filtration Co.

Circle 22 on posteard for free copy (See preceding page)

TAP ENGINEERS SPECIALIZE AT HY-PRO!

... to help cut your production time

Hy-Pro is in business to produce taps. Towards this end, we concentrate our operation upon one important line. Design, production, delivery, and service are all specialized to supply the top quality taps best suited to your needs. Hy-Pro's proven success stands behind this reputation as the "tap specialist."

Experienced engineers are ready to advise you at any time. Whether it is a special problem or one in your regular set-up, the chances are that they can help you save time and money.

For full information, call us today or contact your local Hy-Pro jobber. Our engineering specialists and full line of quality taps are at your service.



HY-PRO TOOL CO., NEW BEDFORD, MASS., U. S. A.

ADDITIONAL WAREHOUSES:

6046 College Ave. OAKLAND 18, CALIF. Piedmont 5-4337 10428 W. McNichols Rd. DETROIT 21, MICH. University 4-1077 6141 North Elston Ave. CHICAGO, ILL. Newcastle 1-6486



FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 73

Overheat Detector

Recently announced is an aircraft fire-and-overheat detector that is said to be capable of prolonged operation at 1000 F. Designated as Model 1734329, Type E-4, it is rated at three amp at 28 v dc. Fenwal, Inc.

Circle 26 on page 73 for more data

Safety Wire Twister

Recently introduced is a safety wire twister known as the Ziptwist. The unit is said to produce either right or left symmetrical twists and is specifically designed for aircraft industry use. Herco Products.

Circle 27 on page 73 for more data



Standard-Thomson shut-off valve.

Portable, 400-c Frequency Converter

Recently developed is Model 400 frequency converter. This portable 400-c power supply operates from a standard 60-c line and is capable of delivering up to 100 v-amp. It is said to be especially suitable for laboratory use in the development of low-power aircraft equipment.

Output voltage is variable by a front panel control, from 105 to 130 v, with regulation reportedly better than ±1 per cent. Frequency is adjustable

from 380 to 420 cps with less than ±1 cps drift. Total harmonic distortion is less than three per cent.

Basic components of this converter consist of a standard high-power audio amplifier, an adjustable tuned circuit, and an adjustable bridge circuit which controls the voltage output. The circuit contains a total of eight tubes. Avion Instrument Corp., Div. American Car and Foundry Co.

Circle 28 on page 73 for more data



Avion frequency converter.

Fuel Shut-off Valve

Now in production is a 1¼-in. motor-operated fuel shut-off valve for the B-47 bomber. The number of valves installed throughout the fuel system of each bomber will vary from 32 to 36, depending upon the model.

A notable feature of the valve is a cam-operated mechanism which retracts the seal rings from the valve gate just before the gate is set in motion. The rings remain retracted until the gate is returned to the closed position.

Another improvement is an override mechanism in the actuator which provides positive positioning of the gate. It disengages the actuator from the gate in full open or full closed position. At the same time, it provides for prompt re-engagement.

The motor is a simple permanent magnet type powering a uni-directional, planetary gear actuator. A thermo-relief valve permits fuel to bypass the valve gate under pressures resulting from fuel expansion due to extreme temperature changes.

The valve reportedly can carry a load of up to 2000 gal of fuel per hour in either direction at outlet pressures as high at 60 psi. It is required to operate satisfactorily at -65 F to 160 F ambient temperatures. Standard-Thomson Corp.

Circle 29 on page 13 for more data

Wind Indicator

Now available is a wind direction indicator that is said to be controlled completely by an electric clutch. Chief feature of the unit is that it can be remotely controlled from the airport traffic tower or can be controlled by the natural wind velocity.

The indicator allows the control tower to point out the preferred runways to approaching aircraft which are not equipped with a radio communication system. Industrial Dir., Warner Electric Brake & Clutch Co.

Circle 30 on page 73 for more data

Are retained lubrication and long bearing life vital?

here's how leading harvesting machine manufacturers

secure them with NEEDLE BEARINGS

Torrington Needle Bearings are important design features on many harvesting machines because of their unique ability to retain lubricants, and because of their long service life.

They have been *performance-proved* in machines which handle a wide variety of crops, on every type of soil and terrain—including combines, corn or cotton pickers, mowers and other miscellaneous harvesting equipment.

Needle Bearings in such machines are found in main drives, gearboxes, crankshafts, bell cranks, idler pulleys, sprockets, steering gears and various linkages. The small but rugged Needle Bearing has capacity for long life under punishing loads and severe operating conditions always present in the use of such equipment. Furthermore, the turned-in lips of the Needle Bearing's outer shell retain lubricants for long periods—reducing down time for relubrication to a minimum.

Needle Bearings have become "standard equipment" throughout industry since their introduction nearly twenty years ago. Their low cost, small size, and ease of installation make them the natural choice for increasing numbers of anti-friction applications.





TORRINGTON NEEDLE BEARINGS

Needle • Spherical Roller • Tapered Roller • Cylindrical Roller • Ball • Needle Rollers



The BUSINESS PULSE

Business Appears To Be in a State of Equilibrium with Industrial Production Holding Up Well During Summer Months. Consumer Demand Has Been Higher, But Goods Are Accumulating at an Increasing Rate.

This Survey Is Prepared Exclusively for Automotive Industries by the Guaranty Trust Company of New York

No Pronounced Business Trends

As the summer period draws to an end, the business situation is characterized by an absence of pronounced trends. Most of the basic indicators, after seasonal adjustment, are apparently holding fairly close to the levels reached toward the end of the second quarter, without showing much tendency to move either upward or downward. We are, in other words, in a situation of apparent equilibrium in which the exceptional momentum evident during the spring months is no longer visible. Observers are of varying opinions regarding the significance of this "suspended animation." Some see in it nothing more than the traditional summer letup, while others incline to the view that it marks the beginning of a cyclical adjustment to lower levels of economic activity. For the present the evidence is inconclusive, and it will probably be sometime this month before a clear pattern emerges.

Available data indicate that the volume of industrial production held up relatively well through July and August.

In the steel industry, production did slacken somewhat as compared with the earlier months of the year, but the actual volume of tonnage compares favorably with that in previous years. However, steel demand is clearly less persistent than was the case a few months ago, and fourth-quarter order books reportedly still have plenty of room for business. Output during the first seven months of the year totaled about 63 million tons. If the same rate of output could be maintained for the rest of the year, total 1953 production would amount to about 115 million tons. However, in view of the moderation of demand few people

anticipate more than 112 million tons, while some estimates range down to 105 million tons.

In the automobile industry the destruction of General Motors' Livonia transmission plant by fire has clouded the immediate outlook. At first it was estimated that production losses would be very heavy, but more recent reports suggest that emergency measures by General Motors (the use of substitute transmissions in those cars normally using the type produced at the Livonia plant and the leasing of space for transmission operations at Willow Run) may keep losses at a minimum.

Rates of output in other basic industries have held up well, to judge by weekly reports. It seems likely that, when the final figures are in, they will show industrial output as a whole in August not far below the June level.

Consumer demand has probably been higher than in any previous summer, but it is a question whether it has been sufficient to prevent further inventory accumulation. Total sales of retail stores in July, on a seasonally adjusted basis, were smaller than in four of the six earlier months of the year, although they were six per cent above the July figure a year ago. Weekly sales figures for department stores covering later periods do not seem to indicate any marked recovery. It will not be surprising if the final figures show some additional rise in inventories during the summer months, although any such conclusion at present is highly tentative.

Inventories Increase

The inventory picture is often cited as evidence of a coming business readjustment. Stocks of goods increased during the second quarter of the year at an annual rate of \$8.8 billion, as against \$2.9 billion in the first quarter. The increase for the April-June period was the sharpest since mid-1951. It exceeded even that in the last quarter of 1952, when inventories were being rebuilt after the steel strike. There are some signs that the recent rise was largely involuntary, reflecting a level of demand somewhat below current rates of output. It occurred mainly in finished

(Turn to page 118, please)

Instead of simply saying the industry is learning it pays to say

Sealed Power KromeX

3 vital surfaces chrome-faced

Top compression ring is chrome-alloy cast iron with SOLID CHROME face, factory-lapped to a light-tight finish, with Granosealed sides for flexibility.

2 Side rails of MD-50 oil ring have SOLID CHROME faces. Granosealed sides for flexibility. Hundreds of thousands of cars have proved this ring best for oil control even in badly tapered and out-of-round bores.

All rings in Sealed Power KromeX Ring Sets are beveled or tapered to thread-line contact for quicker seating and blow-by control.

FIGHT HEAT,
FRICTION, ABRASION
CORROSION

the four worst enemies of piston-ring life

25
MAJOR ENGINE
BUILDERS
use
Scaled Power
chrome rings!

Sealed Power Piston Rings

Sole manufacturers of KromeX Ring Sets, MD-50 Steel Oil Ring, Full-Flow Spring, Flex-S Flexible Oil Ring, and GI-60 Groove Inserts.

Leading producer of Automatic Transmission Rings, Power Steering Rings, and Non-Spin Oil Rings.

MD-50 STEEL OIL RING

The only ring with the Full-Flow Spring Best for oil control even in

BADLY TAPERED

OUT-OF-ROUND BORES

AVIATION INDUSTRIES

Continued from Page 24

Carboloy, 25 Years Old, Cites Machining Gains

Carboloy Dept. of General Electric, at Detroit, celebrating its 25th Anniversary of service in the field of cutting tools, has noted the revolutionary changes that have taken place in machine tool design as well as metal cutting practice in that time.

According to records turned up by Carboloy, 25 years ago and even as late as 1939, when cemented-carbides began to play a role in steel cutting, many of the familiar machine tools were commonly equipped with only one to three hp motor drives. A rare case of a 20-hp lathe was considered outstanding at the time. High-speed-steel cutting tools were removing steel at around 50 sfm with average feed of 1/16-in, and ½-in, depth of cut.

Today cemented-carbides are claimed to outperform H-s-s cutting by about 15 to 1 and drives run on the average from 15 to 20 hp. Metal is being removed at an average rate of 50 sfm, on many applications, with \(\frac{1}{2}\)-in. depth of cut, and 0.015 in, feed. Such high cutting rates for steel are encouraging high speed planer manufacturers to think in terms of 40 to 50 hp drives, on the average, one special application in limited production reportedly cutting steel at the rate of 1200 sfm.

Although its reputation was made as a producer of cemented carbides for cutting metals, Carboloy adopted these materials for wire drawing dies about 1934. In fact, this application furnished the business start for a company still wobbling in the wake of the depression. Fortunately, about this time a huge order for cutting tools from one of Detroit's leading automotive manufacturers catapulted Carboloy into the cutting tool business. The parallel development of diamond grinding wheels, new brazing furnaces, and "pill" presses for mass producing carbide blanks all aided in meeting the then growing demand.

BLACK

Among the many applications of silicones in the automotive industries exploited recently by Dow-Corning is the use of siliconebase paint for heat resistance. Lincoln for some time has finished exhaust manifolds with a black paint developed by Midland Industrial Finishes, to hold up at 1000 F. At Lincoln it is sprayed on. then baked



Carboloy has specialized in "created" metals—cemented-carbides of many grades, chromium-carbides, permanent magnets, thermistors, and Hevimet.

Garden Plows Up

Growing popularity and widening market for garden type tractors since the end of the war is shown by the latest government figures on production and factory shipments. In the seven postwar years, this segment has jumped from an annual business of something less than \$1½ million to more than \$28 million (factory prices).

Factory shipments averaged about 9100 units in the prewar years, jumping to nearly 17,000 in 1941, last prewar year, the Census Bureau says, rising to the level of 26,000 annually by the end of the war. Final figure for 1952 stood at 199,000 for domestic use and 4900 for export.

(Turn to page 144, please)

1953 MOTOR VEHICLE FACTORY SALES*

	Passanner				
	Cars	Trucks	Buses	1953	1952
January.	453 319	111,599	284	565,172	375,410
February	486.071	98.740	190	583.001	435,216
March	566,320	134,129	236	700.685	482,973
April	596.633	128.754	145	723.532	529.585
May	549.677	93.443	367	643,487	503,917
June	587.549	74.063	380	661,992	518,710
July	599.077	105,622	376	705,075	211,782
Total - Seven Months	3.838.646	742 350	1.948	4 582 944	3 067 593
TOTAL GOVERN INTONITIES	0.000,040	142,300	1,040	4,000,044	0,001,003

1953 MOTOR TRUCK FACTORY SALES BY G.V.W.*

E 001 10 001 14 001 16 001 19 501 Over

	and less	10.000	14,000	16,000	19,500	26,000	26,000	Total
January	53.077	21,481	4.087	16,333	3,950	8.766	3.905	111,599
February	45,121	18.279	3,413	13,305	4.287	8.255	4.080	96,740
March	59.951	25,153	6,159	22,962	5.618	9.563	4.783	134,129
April	55,652	25,680	5,770	21,005	5,187	8,856	4,604	126,754
May	43.812	16.293	3,580	13,379	4.823	7,900	3,656	93,443
June	33.297	11,628	2,169	10,102	4.549	8,217	4,101	74,063
July	51,318	18,697	4,220	15,788	4,231	7,635	3,753	106,622
Total-7 Mos. 1953	342,228	137,211	29,398	112,854	32,645	50,132	28,862	742,350
Total 7 Mes. 1952	254,832	132,930	36,640	138,240	31,883	82,512	28,938	685,975

* Automobile Manufacturers Association



Thompson firsts that make T.P.M. valves best

Thousands of Thompson T.P.M. Valves are piling up amazing service records in military and commercial aircraft engines. Hundreds of hours of severe service leave T.P.M. Valves looking literally as good as new. Time between valve overhauls is lengthened. Maintenance costs are reduced, lost flight-time due to valve failures has been practically eliminated.

Here's why . . .

ALLOY

T.P.M. is the new valve material developed by Thompson to give greater corrosion resistance and higher strength.

SHOT PEENING

mechanically hardens T.P.M. stems to provide longer service with less wear.

CONTROLLED ATMOSPHERE

application of a Thompson-developed hardfacing material by arc-weld, assures a tough, homogeneous layer to resist high head temperatures.

ENGINEERED HEAT TRANSFER

the sodium cavity is carefully designed to provide the correct rate of sodium cooling of stem and head.



VALVE DIVISION

Thompson Products, Inc.

CLEVELAND 17, OHIO

AIRBRIEFS

By ROBERT McLARREN

Rotary-Wing DC-3

It now appears that the long-sought "DC-3 replacement" will be a helicopter instead of a fixed-wing airplane. It will be recalled that every Congress since World War II has been asked to provide funds for a "feeder liner" and methods of financing a prototype have been advanced by the Civil Aeronautics Administration, the Aircraft Industries Association and by various senators themselves-but no appropriation has yet been made. Meanwhile, most transport manufacturers have studied the problem and completed designs ready for fabrication-pending orders-but none have come. The problem is to provide a machine to handle 20-30 passengers on route segments in the 200-300 mile bracket, a capacity and distance just too low for present airline transports. Yet the DC-3, which made millions of dollars for a decade doing this job appears now to be uneconomical for the purpose. Both Sikorsky and Piasecki will fly machines this year ideally suited for just such work plus their verticallanding and takeoff capabilities. The Sikorsky S-56, now nearing completion as the Marine Corps HR2S-1, has been slightly redesigned for civil use powered by two gas turbine engines driving a single five-blade rotor. The new machine will carry 50 passengers at a speed of 160 mph over a 200-mile range and can operate from close-in "heliports." The Piasecki machine, a development of the Air Force XH-16 due to fly this year, will have dual tandem rotors driven from individual gas turbine engines. It, too, will carry 50 passengers at a cruising speed of 150 mph over a 200mile range. Both machines can be ready for delivery by 1959, the companies say. Major problem is the generally-held requirement that these machines cost no more to operate than the DC-3, a very tough demand but both companies believe they can achieve this low cost given suitable time for development of engines and the completed machines. Thus, the idea of the helicopter as a downtown-to-airport vehicle has now moved well into the intercity route field-and it is still growing.

Identity Radar

Airport Surveillance Radar, now in use at major terminals in the U. S., provides enormous assistance to traffic controllers in locating aircraft in the terminal area, particularly in bad weather (although it has proved surprisingly useful in clear weather). Its only shortcoming is its inability to identify its target, which must be done by radio interrogation and the performance of a requested maneuver. Now the Air Navigation Development Board is taking steps to adopt the radar transponder system used universally in the military services. Developed during World War II, this system locates a radio set in the airplane which is triggered when the radar beam strikes it. The radio set automatically "transponds" with a radio signal which identifies the airplane through a pre-selected code. This energy also provides a strong "echo" which brightens the "pip" on the radar scope. The new ANDB unit will also operate on a frequency of 1000 mc, instead of the 3000 mc used by the military. Following its joint membership, the group has designated the Navy to develop the new equipment. First units are expected for test next year and installation could begin shortly thereafter. Fleet-wide installation of such radar transponder beacons would insure positive identification of aircraft appearing on the airport surveillance radar scope.

Women in Aviation

Although the ratio and the total are still far, far short of the World War II peak, the U. S. aviation industry now employs about 176,000 women in its various branches. The aircraft manufacturing industry has a weekly payroll of about \$11 million to the 135,000 women it employs. U. S. scheduled airlines employ about 20,000 women and about 18,000 are in service with the USAF, Navy and Marine Corps. About 3000 women flight nurses are now on duty in the armed forces.

Big Job

Although it is usual to picture the bureaucrat in Washington as a man with a clean desk, Defense Secretary Wilson is making it much harder to keep things that way. Here is his list of assignments for the Assistant Secretary of Defense for Supply and Logistics, a post now held by Charles S. Thomas: Periodically review the equipment used by the various services; make recommendations for regrouping, com-

(Turn to page 152, please)



Shipping Weight—3 pounds

10 pound pull with 1/2" stroke

Current Consumption—220 W pulling, 6.5 W holding Either grounded or ungrounded

For further information ask for BULLETIN 410

Automatic Engine Control Equipment

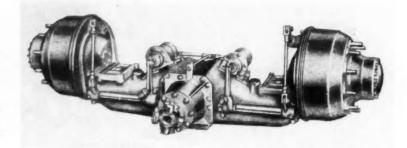


Vehicle Industry

(Continued from page 56)

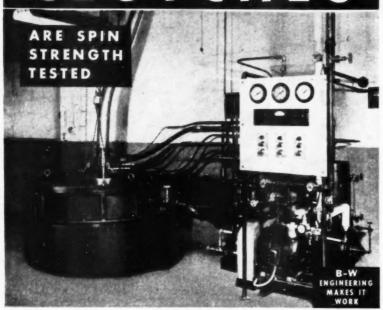
on a forward control chassis of Usection pressed steel with six riveted cross members which is made in two sizes for seating 38 or 42 passengers. There are semi-elliptical lateral springs front and rear and air braking to all four wheels. Planetary gearing in the double-reduction rear axle provides an overall ratio of 6.8 to 1. Wheelbase of the 42-passenger bus is 208 in., overall length 408 in., and

turning radius 340 in. Unladen weight is nearly nine tons, and maxi-



Double reduction rear axie used in the Saurer 5 GF-ST 26-passenger town bus. It permits a floor height of only 29 in.

ROCKFORD



To determine the bursting speed of ROCK-FORD CLUTCHES, they are spun up to a high R.P.M. in this air turbine speed chamber. This test assures they will continue to perform efficiently at the speeds for which they were designed. Let ROCK-FORD engineers devote the benefit of this and many other tests to your product's clutch design.



B-W PRODUCTION MAKES IT

ROCKFORD CLUTCH DIVISION WARNER

315 Catherine Street, Rockford, Illinois, U.S.A.

mum speed 55 mph. The body of this touring coach is of clean design, with large side and overhead windows, sliding canvas roof, and good quality upholstery. Other buses, all using the 130 hp engine, are of similar construction.

Saurer trucks have much the same features, and different models are derived by combining standard engines and chassis. These are available with load ratings of 31/2 and four tons (90 hp engine), five, 51/2, six and 61/2 tons (130 hp), seven tons (150 hp), and nine tons (180 hp). Body types include drop sided, three-way dumpers with hydraulic ram, tankers, prime movers and panel trucks. Some of these have been designed specifically for mountain work on sharp bends and steep grades, and therefore feature a comparatively short wheelbase and wide steering lock, low gear ratios and compression braking. Automatic trailer coupling, power take-off and front wheel drive are found on a number of them, although there are none with more than two

Steyr-Daimler-Puch AG. is one of the largest industrial works in Austria, but is concerned with the production of stationary engines, tractors, ball and roller bearings, motorcycles, and bicycles as well as with commercial vehicles. It also assembles Italian Fiat cars under agreement with the Turin company. Nearly 4000 of the 1100 and 1400 models were turned out last year.

The production program of Steyr is confined to one engine, two chassis, and bodies for drop sided, dump, and platform trucks and for a 25-place bus. The engine is a four cyl, four stroke Diesel having the same bore and stroke as the Saurer units with a total swept volume of 324 cu in.

(Turn to page 86, please)



Moraine Friction Materials

keep their built-in stability under all operating conditions

oraine friction materials have a number of characteristics that make them highly useful to many industries. For example, by dispersing non-metallic materials uniformly through a semimetallic or metallic matrix, the ultimate materials develop great resistance to wear and remain stable over a wide range of temperatures. In many cases the materials are bonded to a steel support which provides additional strength and increases the range of their application.

Moraine friction materials have proved themselves in automatic transmissions such as Powerglide, Dynaflow and Hydra-Matic. They are equally successful in special military vehicles and equipment, household appliances, and automatic transmissions for trucks of all sizes.



DIVISION OF GENERAL MOTORS CORPORATION, DAYTON, OHIO

ELEVATOR FEEL TRIM

Airborne Actuated on Navy's F2H-3





The elevator feel trim system in this McDonnell jet is actuated by Airborne's Model R-144M12-1 LINEATOR®. A ball bearing jackscrew enables this actuator to operate at 11 inches per minute with an 800 lb. load in either tension or compression.

The "T" type LINEATOR fits many situations where light weight and short length, for a given stroke, are desirable features.

Perhaps you have a similar application. Our literature in the I.A.S. Aeronautical Engineering Catalog gives detailed data on LINEATOR and other actuators manufactured by AIRBORNE.



1414 Chestnut Avenue Hillside 5, New Jersey and an output of 90 hp at 2300 rpm. It has subdivided combustion chambers, wet liners, light alloy pistons with four compression and two oil rings, separate cylinder heads, a five-bearing crankshaft, overhead valves, forced-feed lubrication and oil filter with automatic cleaning.

Power is transmitted through a single plate dry clutch, five speed gearbox similar to the Steyr, and a divided propeller shaft to the rear axle with spiral bevel drive and differential lock. Semi-elliptical springing is used throughout, with hydraulic shock absorbers in the front. Footbrakes are hydraulic, with a mechanical hand brake operating on the dual rear wheels.

The chassis have a load rating of five tons, and the type 380 drop-sided truck, the most common model, has a 146 in. wheelbase, 265 in. overall length, and a 154 in. by 82 in. body. Top speed is stated to be 48 mph, and one in three the maximum gradient with a four ton load. When fitted with a long platform body the welded sheet steel chassis is extended for a 165 in. wheelbase. The longer chassis is also used for the passenger bus which has overhead windows and a sliding roof.

The Gräf & Stift line of vehicles, six and eight ton trucks and a rearengined coach, are of interest because of their use of a two stroke Diesel engine of unusual design which features compactness and simplicity. This is made with four or six cyls in V-form with peak ratings of 125 and 180 hp respectively at 2000 rpm. The Gräf & Stift engines were described and illustrated in the August 15, 1952, issue of Automotive Industries.

The small Warcholowski works in Vienna is another producing a vehicle engine of unusual design. This is a two-cyl, V-type, aircooled Diesel of unit construction intended for rear mounting in a light truck or car. Rated at 18 hp at 2800 rpm, it is of four stroke operation with the twin cylinders of 61 cu in. displacement cooled by a radial blower combined with the flywheel. Clutch, four speed transmission and differential are contained in a rectangular housing bolted to the engine. Dry weight is 250 lb.

AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of Automotive and Aviation

MANUFACTURING



Shaped Wire*

- Flat

Round

S Odd contour

Low or high carbon, stainless, special alloy, Armco. You draw the shape—PAGE can draw the wire.

Armature Banding Wire

Tinned stainless or carbon steel. In reels of 50 to 200 pounds. Stainless has high tensile strength, high resistance, low permeability.

Lock Safety Wire

Tough, durable, workable.
In the size and type for your work.

Spring Wire

Any shape*...high carbon...hard drawn...high tensile...stainless...galvanized...tinned...bright.

*Cross-sectional areas up to .250" square; widths to 1/4"; width-to-thickness ratio not exceeding 6 to 1.

YOU do this-

Give us the specifications of the wire you need—or tell us details of job to be done.

WE'LL do this—

Send you recommendations, prices and delivery date. Samples on request. PAGE offers you a wide variety of wires to choose from.

Wire or Write Today

PAGE WIRE





Honessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.



Today, Fenders—Tomorrow, Body Tops Clearing Line Gives Jarecki Productive Flexibility

Jarecki Machine & Tool Co., in Grand Rapids, Michigan, nationally known as a producer of large dies for the automotive industry, also specializes in the manufacture of automotive stampings. Maintaining leadership in this field demands a thorough understanding of stampings production and the press equipment that can best accomplish that job.

The line of Clearing presses shown here provides Jarecki with the flexibility required to

manufacture a wide range of stampings on a contract basis. Today these Clearing presses are turning out automotive fenders. Tomorrow the press run may be body tops or truck hoods.

If you are looking for press equipment that can be most effectively applied to the variety of stampings you manufacture, let Clearing recommend the presses that will do your overall job at the lowest cost to you. Call on Clearing Machine Corporation without obligation today.



THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION, 6498 West 65th St., Chicago 38, Illinois . HAMILTON DIVISION, Hamilton, Ohlo

THE CHALLENGE of Plastics

(Continued from page 49)

Some of the other possibilities thought of for passenger car bodies include door panels, compartment shells, interior wheelhouse covers, trunk linings, heater ducts, seat backs, anti-glare instrument panel covers, instrument panels, and seat side panels. Several of these applica-

tions could also be utilized by the truck and bus manufacturers.

Two such products in this line include Royalite, made by U. S. Rubber, and Campco S-300, produced by Campco Div., Chicago Molded Products Corp. The latter is a newcomer to the field and has recently put up a

new \$500,000 plant to produce some 500,000 lb of the material per month.

The phenolics, although widely used for automotive parts, have comparatively few body applications other than for waterproofing. Steering wheels have been made with the material, and there is a possibility that chrome plated parts of conductive phenolic will be used for such functional purposes as radiator grilles. Some phenolics are used in the primer coat of paint. Phenolics are generally strong and very hard, and are poor conductors of heat. Last year, some nine phenolic manufacturers turned out 329.7 million lb of the material. of which the automotive industries used approximately 47 million lb.

Although there are no production applications to date, "Hypalon," recently placed on the market by du Pont, appears to have many body uses. "Hypalon," chlorosulfonated polyethylene, is an elastomeric ethylenic polymer that is said to have complete ozone-resistance and good flexibility. One of its features is excellent colorability since it does not require carbon black for reinforcement. Some of the possibilities for body parts include coatings for sponge weather stripping, window channels, arm rest pads, door scuff pads, and CV strips; as a scuff-resistant coating for rubber floor mats; as a calendered coat on cotton duck for heavy duty upholstery; and as a waterproof coating for convertible topping. Experimentally, "Hypalon" is being combined with a phenolic resin for automotive paint.

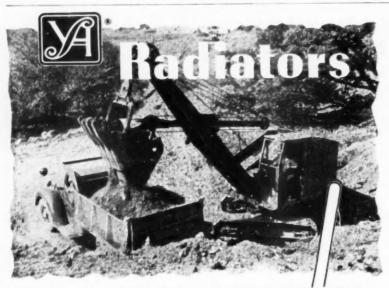
A transparent material produced in film form, called "Mylar" polyester, is another new product put out by Du Pont. Again, this material has not found its way into automotive production as yet. "Mylar" has been tested, and found more than satisfactory, for the side curtain windows on military vehicles. Presently, "Mylar" production is limited and it is being allocated to customers for experimental purposes.

Engine and Components

In this category, the fuel system and cooling system will be considered along with the basic automotive engine.

For engine components, one of the most widely used plastics is the phenolic type. For many years such producers as Continental-Diamond Fibre and Westinghouse have been supplying the trade with timing gears made of phenolic and a filler material. The Micarta Div. of Westinghouse is cur-

(Turn to page 90, please)



KEEP POWER SHOVELS from "Running a Temperature"!

Doing the rugged work of maintaining and grading roads such as this heavy-duty Power Shovel is called upon to handle day after day could easily make its power unit "run a temperature". But with dependable YA Radiator equipment for efficient cooling it steps right out whenever called upon. Perhaps you, too, are building equipment that could well use YA Radiators — write Yates-American for complete information.



California Representative: E. E. Richter & Son, Emeryville, Caf.





THEY CUT THEIR OWN THREADS!

SHAKEPROOF THREAD-CUTTING SCREWS

Cave time ... Save tools ... give you a tighter, stronger fastening!

The shank slot does it! Type 1 is designed for the



harder metals.



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contains SHAKEPROOF Thread-Cutting Screws in a variety of sizes and head styles. Try them on your product now . . . ask for Kit No. 22 for metals or Kit No. 10 for die castings or plastics.



INDEX OF ACP CHEMICALS FOR METAL PRESERVATION AND PAINT PROTECTION

METAL	OPERATION	ACP CHEMICAL
ALUMINUM	Cleaning	"DEOXIDINE" "DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Preparation for Painting	"ALODINE" "DURIDINE" "DEOXIDINE"
	Protection from Corrosion	"ALODINE"
GALVANIZED IRON, ZINC, AND CADMIUM	Cleaning	"DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Corrosion Proofing	"ZINODINE"
	Paint Bonding	"ZINODINE"
	Phosphate Coating, in Preparation for Painting	"LITHOFORM"
N N N	Soldering Flux	"FLOSOL"
	Chromate Coating, in Preparation for Painting	"CROMODINE"
	Cleaning	"ACP RIDOLINES AND RIDOSOLS"
	Cleaning for Painting	"DEOXIDINE" "DURIDINE"
	Coating with Copper	"CUPRODINE"
	Drawing and Extrusion	"GRANODRAW"
STEEL	Paint Bonding	"CROMODINE" "DURIDINE" "GRANODINE" "PERMADINE" "THERMOIL-GRANODINE"
	Paint Stripping	"CAUSTIC SODA AND SOLVENT NO. 3"
	Phosphate Coating, in Preparation for Painting	"DURIDINE" "GRANDDINE" "PERMADINE" "THERMOIL GRANDDINE"
	Phosphate Coating, to Protect Friction Surfaces	"THERMOIL-GRANODINE"
	Pickling with Inhibited Acids	"RODINE"
	Rust Prevention for Unpainted Iron	"PEROLINE"
	Rust Proofing	"PERMADINE" "THERMOIL-GRANODINE"
	Rust Removal—Brush, Dip, or Spray	"DEOXIDINE"
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THE CHALLENGE

(Continued from page 88)

rently supplying four car makers with a total production of 130,000 timing gear blanks per month. One company is experimenting with phenolic sprockets for the new Gilmer rubber timing belt. Water pumps, radiator strainers, and carburetor parts also have been made of phenolic material. One of the latest applications has been for an oil pressure switch designed to give visible warning when engine oil pressure drops below a predetermined limit. It is being made for King-Seeley with a Durez phenolic molding compound. When combined with rubber, the material is particularly adaptable for oil seals.

Nylon also plays a large role for many of the engine, fuel and cooling system components. Current production utilizes such components as spark plug gaskets, oil pan drain plug gasket, water pump connector, carburetor vacuum check valve, fuel pump valve, and rocker arm cover seal. One company has recently gone into production on nylon valve seats for carburetors. The part is being fabricated from rod stock. Nylon can also be used for timing sprockets for the Gilmer belt, complete carburetor bodies and for various similar parts. Other possible applications include fuel pump valve, fuel pump bearing, oil pump gear, and various bushings. A major bearing maker is testing nylon for engine bearings. Some engineers predict that in the not too distant future, plastic materials suitable for engine bearings will be available.

Another possible material for engine parts is Du Pont's "Teflon" which could be used for hydraulic valve lifter oil seals. This material is desirable where higher heat resistance is needed and low coefficient of friction.

Work has also been carried out on the use of the vinyl plastics for fuel filters.

Running Gear and Transmission

Currently there are three major plastics utilized for transmission and running gear assemblies with the distinct possibility of others being added.

Phenolics are being used for bonding brake lining and for the manu-(Turn to page 95, please)

Production Pointers from



SAVING IDEAS



GISHOLT

Presented as a service to production men, we hope some of these interesting ideas, chosen from thousands of jobs, will suggest ways to help you cut time and costs in your own work.

HIGH PRODUCTION SETUP FOR THIN-WALL PARTS

1 Man Tends 3 No. 12 Hydraulic Lathes on Fast, Precision Work

How to get the needed high production on tricky thin-wall parts requiring a large number of operations?

This manufacturer found the most practical solution was dividing the work among three No. 12 Hydraulic Automatic Lathes. By this method only one man is required to operate all three machines, turning out a completed part every 1.3 minutes . . . keeping costs at rock bottom.

Each No. 12 Hydraulic Lathe has the same type 12" three-jaw air chuck for holding the stainless steel ring flange. Compensating serrated jaws, grip the workpiece with support for over three-quarters of the circumference. This eliminates danger of springing the part with total pressure.

Here's fast, precision machining of delicate parts involving 13 operations on 3 No. 12 Hydraulic Lathes—with one operator.



Operations are divided up this way:

1st—Part is held on the O.D. Turn, face, bore, counterbore and chamfer. This single operation completes the thick base section shown here.

2nd—Part is held on previously machined O.D. Rough turn O.D. Rough and finish turn the tapered 1.D., face and chamfer. Part now looks like this. 3rd—Part is held on same surface and supported with a live center. Finish form the O.D., face and chamfer; part is then completed.







Ask for bulletin showing the No. 12 Hydraulic Automatic Lathe doing 28 widely different jobs which illustrate its unusual flexibility.



TIME-SAVING IDEAS

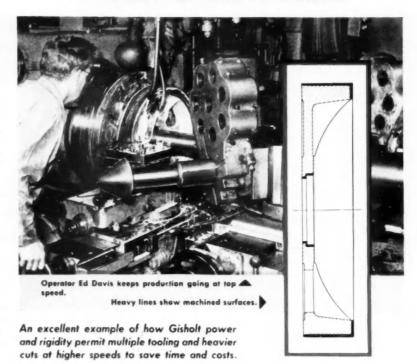
New Saddle Type Lathe Permits Multiple Cutting at Higher Speeds

Perhaps you, too, can take advantage of sheer power and rigidity in a turret lathe to cut your costs. Hyster Company of Portland, large manufacturer of handling equipment, formerly machined these heavy drum gears on a pre-war machine. Production of the 22", 260 Brinell parts averaged an hour for the first operation.

When they put the job on a new Gisholt 4L Saddle Type Turret Lathe, floor to floor time was cut in half—with parts completed in 30 minutes. Simultaneous machining from both turrets, plus faster operating speeds—and the ability to take heavier cuts, account for the increased production.

A 28" three-jaw chuck holds the part in the cored holes in the web. Rough and finish boring, counterboring and facing operations are handled from the cross-feeding hexagon turret. At the same time, tools on the square turret face and turn the O.D. Production is in lots of 100.

HOW TYSTER COMPANY CUT COSTS



FINE SETUP FOR FAST MACHINING OF BRONZE NUTS

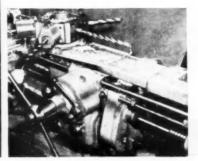
A No. 5 Ram Type Turret Lathe Job

It's mostly inside work to be performed on these hard aluminum bronze castings calling for a 1/8" hole 21/4" long with four t.p.i. Acme threads.

This job is set up on a Gisholt Ram Type Turret Lathe with a three-jaw scroll chuck. The square turret faces to length. Next, three successive stations on the hexagon turret start drill, drill through and bore. At the same time, the O.D. is turned from the square turret.

The counterbore is then made and the hole is reamed full depth from the hexagon turret. The end is then formed from the square turret. Finally, the rough, semi-finish and finish taps are used with the threading attachment on the hexagon turret.

Turret Lathe setup for branze nuts.



This well planned tooling plus instantaneous speed changes with the Hi-Lo trip lever, keep production moving fast.

Engaging the threading



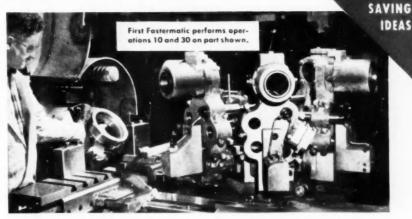
DOUBLE TOOLING FOR 4 OPERATIONS ON 2 MACHINES

Easy Changeover on Fastermatics Simplify Job

The question here was how to perform four separate machining operations on these steel bearings with a minimum of equipment... and with one operator, if possible.

Double tooling of a pair of Fastermatic Automatic Turret Lathes provided the answer. Here's how: Operations 10 and 30 are handled on the first machine, operations 20 and 40 on the other. A single operator, because of the Fastermatics' automatic cycles, is able to tend both machines.

With both sides roughed after operations 10 and 20, he makes easy changeover of the two machines for operations 30 and 40. Double tooling on both machines means simply a change of chuck jaws and some small tool holders.



As shown here, in operation 10, seven different surfaces are rough machined by tools mounted in the turret and both cross slides. Unused turret stations are by-passed. Nine surfaces are finish machined in operation 30—those already roughed out

plus an additional counterbore and a necking operation. The other machine operates essentially the same.

TIME-

With careful planning, 2 Fastermatics do double duty with minimum changeover.

SHOWING HOW "SPECIAL" MACHINING PROBLEMS CAN HAVE SIMPLE SOLUTIONS

... especially with the Simplimatic

Before machining this steel bevel drive gear, this producer had to get answers to:

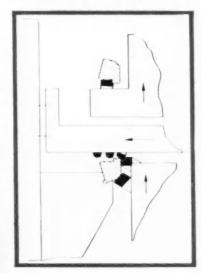
- How to bore, face and counterbore in 1st operation . . . made more difficult because the counterbore is on the chuck side of the piece.
- How to get two tool slides within the 4"I.D. for simultaneous boring and counterboring.
- How to spare the expense of a special machine and elaborate tooling . . . and yet have rapid changeover to the 2nd operation.

The ready answer to all three questions was the standard Simplimatic Automatic Lathe equipped with special tool blocks on standard slides.

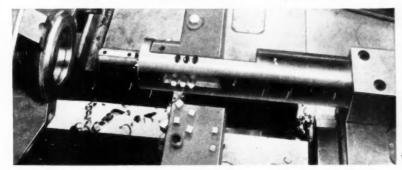
The front slide feeds across the part to face and break the corner. The tool on the rear slide, which backfaces and forms the counterbore, is carried on a holder recessed into the oversize boring bar, thus providing room for getting into work. This boring bar, carried on the center slide which roughs, finishes and chamfers the bore, is supported by the pilot in the spindle (see layout).

Time is only 1.5 minutes, f. t. f.

The standard Simplimatic, with its infinite possibilities of slide and tool arrangements, avoids the need for a special and costly machine.



Note how special tool black in rear slide starts from cutaway in oversize boring bar.





TIME-SAVING IDEAS

HOW TO MULTIPLY OIL SEAL LIFE 8 TIMES

Woodward Governor Company Keeps Seals Oil-Tight Longer by Superfinishing

If oil seals in these diesel engine governors lose their oil-tightness, it means serious trouble: (1) Because the power

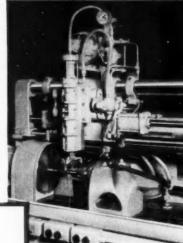
piston operates in a vertical position, reciprocating action could cause loss of sump oil. Also, (2) any leakage at the main drive seal might result in engine oil contaminating governor oil and impairing its operation.

How to make the seals oil tight, and keep them that way longer? The solution was simple: by Superfinishing. It's shown in action here, at Woodward Governor Company, Rockford, Illinois.

The parts come to the Model 51-A General Purpose Superfinisher with a ground finish of 10 micro inches. After Superfinishing, they have a surface smoothness of 3 micro inches. Production is at the rate of 40 pieces per hour—with inspection for size and finish made by the operator, while the machine goes through its automatic cycle.

Here, at negligible cost, Superfinish assures oil-tight seals and at least 8 times longer seal life by removing all amorphous "smear metal."

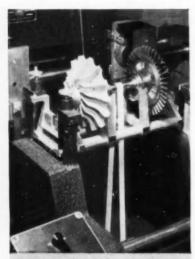




Close-up shows Superfinisher do- aing pilot valve of engine governor.

Superfinished components of governor: drive shaft, power piston, pilot valve, rotating bushing.

HIGH-FLYING PARTS BALANCED TO .020 OUNCE INCHES



Note how the impeller is balanced while running in its own ball bearings.

Direct Reading Shows Stock to Be Removed for Correction

Supercharger impellers for high-altitude aircraft call for dependable accuracy of balance.

Doing the job of assuring smooth, dependable operation is a Gisholt Type 3S DYNETRIC Balancer. The workpiece is rotated with its own ball bearings, thus duplicating normal operating conditions. Unbalance is read directly in terms of stock to be removed. This avoids errors in translating ounce inches into actual cor-

Textbook on balancing, yours for the asking. Has all the facts, helpful information. Write for "Static and Dynamic Balancing."



rection to be made. Stock is removed from the scallop on one end and the rotor on the other.

In a matter of seconds the entire operation—locating, measuring and correcting—is completed, and the part is balanced to an accuracy of .020 ounce inches. Gisholt Balancers are easy to set up and can be operated by average shop personnel.

To insure lasting, vibrationless operation, balancing of impellers is made a regular part of production—with a speed and accuracy not possible on any other equipment.

Complete Balancing School

Students from more than 100 companies have already completed courses in the Gisbolt Balancing School—the only training of its kind available today. Write for details, starting dates.

No. 9-1053



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Write for your copy of Gisholt's new general catalog.

MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES . AUTOMATIC LATHES . SUPERFINISHERS . BALANCERS . SPECIAL MACHINES

THE CHALLENGE of Plastics

(Continued from page 90)

facture of clutch disks. The phenolics when used with rubber may be used for oil seals as pointed out in the engine section of this article. National Motor Bearing Co., Inc., is using a Durez phenolic with rubber to make seals for gear and steering assemblies.

Polyethylene film has made a place for itself in the role of lining for leaf springs. The properties of the material tend to eliminate spring squeaks. Another product used for the same purpose is nylon, and perhaps at this time nylon is the more widely used of the two.

Bushings for king pins and other front end parts have been made experimentally of nylon. While on the subject of bushings it is interesting to note that nylon is found in the bushing of the brake master cylinder push rod on Ford cars. One car maker uses nylon for the clutch cross shaft bearings. In shock absorbers, nylon has been used for the piston ring and guide ring. Nylon is used also for a sheath over the brake pedal return spring. Seals of the material for clutch and brake pedals have been made and are on production vehicles. One of the primary features of nylon for all of the applications just mentioned is that the plastic has the property of being able to operate with little or no lubrication, as well as to resist abrasion, corrosion and flexural fatigue. As a matter of interest, tire valve caps are being made of nylon.

After testing many materials, the Timken-Detroit Axle Co. has now standardized on molded nylon bushings in truck brake camshaft assemblies.

It is understood that research programs have been established for the purpose of testing nylon as the basic material for automatic transmission valve bodies and for power steering components. One passenger car maker, it is rumored, will use nylon parts on a power steering mechanism for a 1954 automobile. Hand brake cables coated with nylon also are under test.

Nylon gears have been used for some time for the speedometer takeoff and worm. More recently, an automatic transmission has been designed which takes advantage of nylon's properties for a governor gear.

Eaton has recently gone to nylon (Turn to page 96, please)



THE CHALLENGE of Plastics

(Continued from page 95)

for the speedometer adapter used in conjunction with its two-speed axles using the Eaton electric shift. In this design, when a gear ratio change is made at the axle, the speedometer adapter has to make a similar ratio change so that the speedometer and odometer readings will check out with the actual truck speed and actual miles covered. Nylon was used since it does not interfere with the magnetic circuit for the shift mechanism.

A possible future use of "Hypalon" which would not only be decorative but functional as well, would be as a blend with natural rubber for white and colored sidewalls of tires. This polymer would add ozone resistance and scuff resistance to the natural rubber tire.

"Teflon," because of its high resistance to temperature change, -320 F to 550 F, is being tried experimentally for automatic transmission oil seals.

Vinyl has been used for tire valve caps; it not only serves functionally but can be made decorative as well.

Electrical System

Next to the body, the electrical system probably uses more plastic compounds than any other major automotive assembly. Perhaps the most widely used plastic, at least by weight, is acrylic. This material is utilized for a variety of dustproof lenses, both interior and exterior, and instrument dial faces. On a majority of the 1953 passenger cars, lenses for tail lights, stop lights, parking lights, license plate lights, directional signal lights and back-up lights are molded of acrylic. Headlight lenses have not yet been made commercially, but there has been much research in this direction and it appears that they might be available in the near future. It is pointed out by Rohm & Haas and Du Pont that molding makes possible much more accurate faceting of lensic sections. Acrylic has been used extensively for edge-lighted instruments and for piping light.

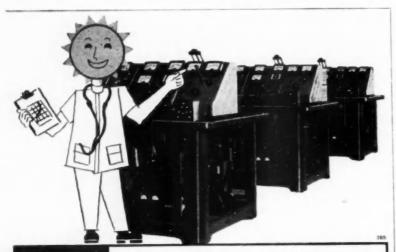
One development which has assisted in the increasing use of the acrylics for lenses is the metallization process. By this means, a lens assembly, formerly consisting of a lens and chrome-plated bezel, can be made by a single molding with the bezel simulated by the metallized portion. The acrylic makers, Du Pont and Rohm & Haas, predict increasing use by engineers for this application because of the cost saving and overall appearance.

As for the electrical components, acetate and butyrate are used basically for knobs on switches. Instrument pointers are also made from these materials.

Some of the larger parts in the electrical system such as distributor caps and rotors, and coil cases are made of phenolic material. The ability to resist gasoline, oil, and grease, as well as heat, are among the assets of the material for these applications. Other parts made of phenolics include dimmer switches, transmission switches for back-up lights, electric windshield wiper switches, various connectors, turn signal switches, and various light switch assemblies.

With the rubber based phenolics coming along, such items as solenoid rings and instrument housings, and other products which have to stand up under physical abuse and perhaps

(Turn to page 98, please)



PRODUCTION TEST STANDS For Engine Parts Assembly

Designed for use in factory and assembly branches of large car manufacturers. Stations are provided for several men to work simultaneously in testing:

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- Ignition Coil
 Fuel Level Indicator
- Oil Pressure Indicator
 Temperature Indicator
- Starting Motor Assembly
- Heat Indicator Bulbs
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 Armatures
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. . for special-order, built-to-specification scientific test equipment . . Sun Electric Corporation is the world's largest manufacturer of Automotive and Aircraft Electrical and Electronic Testing Equipment, supplying approximately 70% of the testing equipment of this type to U.S. automotive dealers. That is why the leaders in every branch of the industry look to Sun as the logical choice to design and build special scientific equipment to meet their particular testing needs. The unit pictured is an example of a test problem solved with such specially designed equipment. Other Sun special-order units are in use in car, truck and tractor factories, aircraft and ordnance plants and in the factories of engine and component parts manufacturers everywhere. In production testing, spot checking and in quality control of material these special Sun Testers offer a high speed simplified operation that will save thousands of dollars and many production headaches.



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Alternator Housing



Diesel Permanent Mold Piston



(33)

Rocket



Air Connector



Outboard Propeller



Wing Actuator

For many years the foundry of Thompson's Light Metals Division quietly cast thousands and thousands of hard-to-make precision parts in light alloys of aluminum and magnesium for customers in the automotive and aircraft fields.

Then word got around in other industries that Thompson had the experience and facilities to cast light-weight, strong, heat-resisting alloy parts in permanent molds and high pressure dies—which eliminated the weight problems of ferrous counterparts. One by one manufacturers of widely different products came to Thompson for help and advice when they learned that the close tolerances achieved by Thompson cut machining and finishing costs.

Today, our capacity is channeled to top-rated jobs. We're building additional facilities as fast as possible and, in the meantime, Thompson services, as always, are at your command. Our entire staff of creative engineers is ready to help you plan new parts or re-design old ones for the future.

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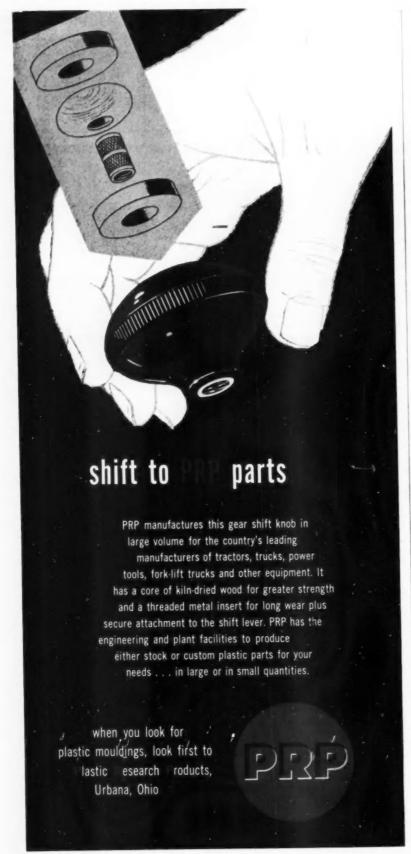
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LIGHT METALS DIVISION



THE CHALLENGE of Plastics

(Continued from page 96)

have to be molded around very large inserts.

Waterproof distributor caps and ignition coils are being molded of melamine formaldehyde, Melmac 592, by Scintilla and Auto-Lite. Melmac is produced by American Cyanamid. Most of the current production is slated for military vehicles and aircraft.

A great deal of wire covering is currently being made from the vinyl family of plastics. Spark plug and distributor boots and various insulators also can be made with vinyl. "Hypalon," which has a high heat resistance, is being tested by a large passenger car maker for spark plug boots.

There are many production applications of nylon and there are further uses which look promising for the future. Currently, dome light lenses, fuse holders, retainer rings, automatic starting switches, horn ring insulators, lamp socket bushings, solenoid and generator insulators, and sundry other products for the automotive electrical trade are made of nylon. In the future ammeter bases, rheostat insulators, circuit breaker parts, and voltage regulator parts will no doubt be made of the versatile plastic.

Windshield Wiper

In this category is perhaps the latest plastic part to be produced—an all-nylon windshield wiper mechanism designed by Sprague Devices, Inc., and being produced by Danielson Mfg. Co. The device is air operated and is expected to be made available to the truck and bus industry in the near future. One of the units on test went through 5 million cycles without failure.

Other windshield wiper parts include the wiper valve for vacuum type mechanisms and the wiper gear for electric units.

Production

During the past year, there has been a great interest in shell molding for foundry use. This technique utilizes phenolic resins for a major part of the process. More and more resin makers have been coming out with resins to compete in this rapidly growing field. In due course, many automotive manufacturers will use

(Turn to page 100, please)

17.000 Expert Employees

NO AMOUNT of modern machinery can operate without the practiced hands of trained people.

Many such experienced and capable people are ready to work for you at AC. 17,000 employees, with a wide range of technical skills, are able to take your manufacturing problems off your hands and convert them into equipment items that will enhance the value and quality of your products.

Besides this vast reservoir of specialized employees, AC has 90 acres of modern factory space, much of it devoted to satisfying the equipment needs of more than 300 manufacturing customers.

Should you have a need for any of the types of equipment being produced by AC, it will be to your distinct advantage to contact one of the AC offices listed below.



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AC SPARK PLUG DIVISION GENERAL MOTORS CORPORATION

THE CHALLENGE of Plastics

(Continued from page 98)

the process almost exclusively for parts of intermediate size.

Another recent production application of plastics has been for dies made of reinforced plastic material. These have been of either the solid cast phenolic type, or a laminated face using a backing of plastic or metal. Some facings use glass cloth and epoxy resin, some iron powder, sprayed metal, or other fillers to develop lower friction and better wear. Metal inserts can be incorporated at suitable locations if desired. These dies have been found useful for some of the simpler forming jobs, and with better knowledge of materials, design and construction methods more extensive application is assured in the future. No doubt, the first public release of these dies was by the Dodge plant making use of Rezolin dies for truck panels (Automotive Industries, September 15,

1952). According to the die-makers, it takes about three weeks to make a plastic die in comparison with 14 to 16 weeks for steel dies.

Aircraft Industry

Throughout the past year or so, there has been more and more emphasis on the all-plastic airframe. The British have made gliders and delta-wings of reinforced plastics. They have used both glass fiber and asbestos for a filler material (see "Plastic Aircraft Development Nears Goal." AUTOMOTIVE INDUSTRIES, June 1, 1952). In this country, the trend seems to be to glass fiber. A great deal of research is being carried out on this project and it is expected that the wings for one military plane will be produced, at least experimentally (see "New Materials Forms Required for High Speed Planes of the Future," AUTOMOTIVE INDUSTRIES, September 15, 1952).

The aircraft industry is also making use of plastics for a variety of other applications, and every day the list grows as new materials are made available. Today, polyester laminates are used for such things as wing edges, and phenolic coated glass fiber materials are being used for hot air ducts, pairings, channels, air intakes, and exhaust ducts. Sandwich materials utilize plastic resins, and resins are used for many bonding materials.

Of course, since the aircraft industry is a comparative low volume producer in comparison to the automobile industry, it is very much interested in plastic tooling and may well take the leadership in that field.

FRENCH CARS

(Continued from page 39)

The Simca "Aronde" has found a large clientele in the medium-price field. A four-cyl, four-passenger car, it is easy to handle and quiet to operate, but its suspension leaves something to be desired. It is a more attractive car than the Peugeot 203, its competitor in this power and price class.

The Ford "Vedette" is a V-8 like its American counterpart and is considered a comfortable car on long trips, thanks to excellent springs and good seats. The Panhard, in four models ranging from 28 to 40 hp, embodies many improvements made since the war. The "Junior," a two-cyl two-seater convertible, is a promising sports model. — From France Actuelle.



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Your product can be made <u>lighter</u>, resulting in shipping economies to consumer...to <u>last longer</u>... and in some cases be manufactured more economically, when made of N-A-X HIGH-TENSILE steel.

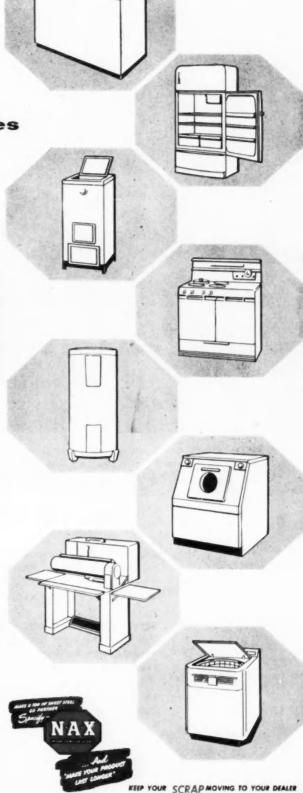
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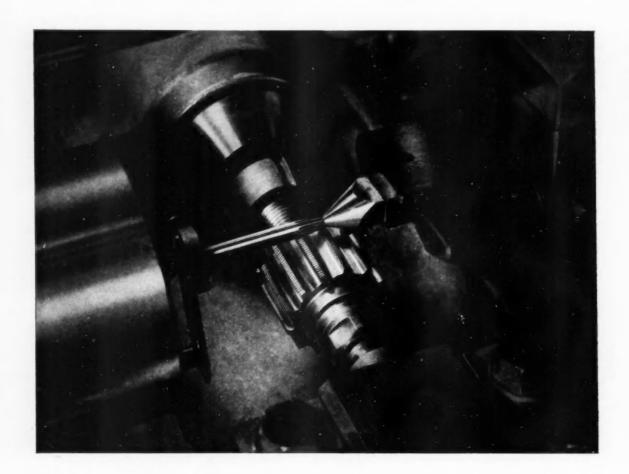
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NATIONAL STEEL







Consistently Better Gears WITH CLASS AA HOBS

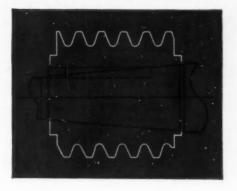
Specialists in the field of instrument gears, G-M Laboratories, Chicago, Illinois employ the latest precision techniques to assure consistent accuracy in their work. Their modern gear department is completely temperature and humidity controlled, and Precision Type Barber-Colman Hobbing Machines are used.

To produce the finest gear accuracy, this firm has standardized on the use of Class AA hobs with taper bores for their precision work. Experience has shown that Barber-Colman Precision No. 6-10 Hobbing Machines, in combination with Class AA hobs, give them the most accurate tooth form and spacing. All gears are finish hobbed, without further finishing operations. Tolerances on the pinions shown here consistently check within .0003" tooth-to-tooth composite error, and .0006" total composite error.

GREATER NUMBER OF CLOSE TOLERANCE GEARS USING CLASS AA HOBS

Although the hob is not the only factor affecting the accuracy of gears, it does have an important effect, particularly upon the profile of the gear tooth. Class AA hobs are made to consistently closer tolerances than any other hobs, and have proved themselves in actual production for many years. Performance records show that, per sharpening, Class AA hobs produce more gears with close tolerances than any other hobs.







Class AA hobs are recommended for the utmost in precision, where other conditions warrant the use of a tool of this class. This accuracy in the tool, however, may be lost if the hob is not properly mounted or trued on the machine. Because of this, Class AA hobs are recommended with taper bores. The taper makes it much easier to true hobs on the arbor where high accuracy requirements are demanded. Compared with the sliding contact on straight hole hobs, the taper provides metal-to-metal contact, eliminating the possibility of an increase in runout during the cutting operation. Time is also saved for the operator because the hob will run as true as the spindle.

Production-line accuracy in all metal cutting operations is constantly approaching closer limits, Gear hobbing is perhaps the outstanding example. When you have gear tooth problems be sure to ask Barber-Colman Hobbing Engineers to work with you. Their long experience in gear cutting is available to you without cost or obilgation.



Write for a copy of Hobbing Notes — "Hobbing Accurate Gears"

HOBS • CUTTERS • REAMERS

HOBBING MACHINES

HOB SHARPENING MACHINES

BARBER

Barber-Colman Company

GENERAL OFFICES AND PLANT,

739 ROCK STREET, ROCKFORD, ILLINOIS

HOBS AND MACHINES SINCE 1911

AUTOMOTIVE INDUSTRIES, September 15, 1953

103

WHELAND COMPANY solves warpage problem, saves time, labor and materials with

FARQUHAR Hydraulic Presses



THE Wheland Company, Chattanooga, Tennessee, uses Farquhar hydraulic presses to help speed production of vital defense products. For example, a 500-ton Farquhar Press is used for straightening forged tube approximately 16' long, varying in outside diameter from 6" to 10", with an inside bore of 2" diameter. This operation alone has solved one salvage problem, since less scrap results as stock distribution is equalized by straightening.

Scrap and salvage due to warpage have been eliminated in another operation, where a 50-ton Gap-Type Farquhar Press is used to straighten \(\frac{1}{6} \)" bars, 3" wide, 65" long. Together, the two presses have speeded production. Neither press has required any maintenance other than regular services since installation!

Farguhar Presses Cut Your Costs

Just one more example of costcutting Farquhar performance in modern production! Farquhar Presses are built for the job . . . assure faster production due to rapid advance and return of the ram . . . greater accuracy because of the extra guides on the moving platen . . . easy, smooth operation with finger-tip controls . . longer life due to positive control of speed and pressure on the die . . . long, dependable service with minimum maintenance cost!

Farquhar engineers are ready to help solve your production problems. Your request will bring them running . . . at no obligation, of course.

For free catalog, write to THE OLIVER CORPORATION, A. B. Farquhar Division, Hydraulic Press Dept., 1523 Duke St., York, Pa.



THE OLIVER CORPORATION . A. B. FARQUHAR DIVISION

European Civilian and Military Vehicles

(Continued from page 38)

and Alfa Romeo in Italy. Large numbers of Willys Jeeps are in service in France with nationally-built parts. The Land Rover is assembled and partially produced in Belgium. With the exception of the Renault, all these models have a direct military application, but no attempt whatsoever has been made to render them in any way interchangeable. Practically the European armies have six different types of automobiles built to the same performance requirements without any attempt at standardization.

All six models have four-cyl engines, with F, L, and I heads, and with outputs varying from 48 hp for the Renault to 80 for the Rolls-Royce type Austin. The accompanying table shows the variations in the six European types (the Willys being omitted).

Except that the Austin has a fivespeed transmission, there is little variation in the drive, all models having four speeds with a relay, giving a total of eight. The Austin and the Delahaye have independent suspension all round; the others have independent suspension in front. Dimensions vary only slightly, wheelbases running from 78 to 86 in. Bodies are all of the same general type, being based essentially on the original American Jeep.

Austin in England and Delahaye in France appear to have given primary consideration to military requirements, while others appear to have sought to produce a civilian vehicle capable of military application. The farthest removed from the pure military type is the Renault, which is a four-wheel drive making use of a standard engine and standard truck parts, and appealing more to farmers than to the military. Indeed, it has not been accepted by French military authorities.

AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of Automotive and Aviation

MANUFACTURING

Bendix, rondive Electric Fuel Pump

Prevents Vapor Lock



Helium sealed for longest life.
 Better cold weather.

at maximum · Only 7

watts pow

starting.

- better performance
- tter gas mileage
- reduced service expense

Today it's more important than ever that car and truck manufacturers take every precaution to prevent vapor lock in their vehicles. Modern design and more volatile gasoline contribute immeasurably to increased power and speed; but in achieving these desirable goals heat problems are sometimes increased to the point where vapor lock occurs. Then, gas mileage is reduced, gains in power and speed are nullified, and worst of all, if vapor lock occurs frequently, exhaust valves burn out and expensive overhauls are necessary.

Fortunately car and truck manufacturers can now guard against this hazard. By installing Bendix* Electric Fuel Pumps, vapor lock can positively be prevented and the efficient performance built into the vehicle will be Jelivered under every operating condition.

In today's competitive market, here is small investment that will pay big dividends in increased customer satisfaction. Descriptive folder available on request.

ECLIPSE MACHINE DIVISION

Elmira, New York · Division of Bendix

vents vapor lock.

re-starts.
• 30 gailons per hour.

Built-in pres Instant hot weather

no flooding.

Check these Features

Combustion in Automotive Engines

(Continued from page 35)

the large contribution of the coolflame reactions in raising the mixture temperature to the necessary 1100 F. The fact that the hot-flame stage of combustion begins at very nearly the same temperature for all fuels may indicate that this stage takes place as the result of the production of a single essential intermediate compound during the earlier stages of reaction. Or perhaps the reactions which occur are common to all the fuels studied.

While n-hexane was being used as a fuel in the variable-compression engine, eight samples of the combustion gas were removed and analyzed in the mass spectrometer. Mixture composition was then plotted as a function of time during autoignition.

When a lean mixture was used, no large change in chemical composition occurred between the start of peroxidation and the beginning of intense cool flames. During the cool flame, however, the hexane decomposed into several olefins, acetylene formaldehyde, carbon monoxide, carbon dioxide, and water. By the time the hot flame began, only about onethird of the hexane had decomposed, and this small amount of fuel had undergone sufficient oxidative degradation to cause a temperature rise of about 450 F. In the early part of the hot flame most of the original fuel and fragments, including formaldehyde, were decomposed, while hydrogen and acetylene were formed in large quantities along with small amounts of diolefins and benzene.

Other sample analyses made with a series of branched and cyclic paraffins show that these fuels all produce olefins, carbon oxides, and water during the early reactions. The lower-octane fuels give larger quantities of these products, and in addition, produce formaldehyde and acetylene during the cool flame.

The rapid increase of acetylene (C_2H_2) concentration in the hot flame is one of several pieces of information which tend to corroborate the results obtained in the past year by R. E. Ferguson. These results suggest that acetylene is an important intermediate in the hot-flame combustion of hydrocarbons. Work is now being carried on at NBS to determine the part played by acetylene in the earlier stages of combustion.

There is also considerable evidence, both from the NBS studies and from those in other laboratories, that acetylene may be the essential intermediate in carbon formation in burning mixtures. Carbon is readily formed in knocking combustion in engines, even with lean mixtures, and this may indicate that the formation of carbon from the acetylene present is a faster reaction than the direct oxidation of acetylene under these conditions.

BOOKS...

ENGINEERING DATA ON THREAD AND FORM ROLLING, published by Reed Rolled Thread Die Co., P.O. Box 350, Worcester 1, Mass. Price, \$1.00. The engineering data contained in this pamphlet has been prepared to provide a source of comprehensive technical information on thread and form rolling for design and process engineers and those actively engaged in the application of the thread rolling process.







J. M. CLARK Purchasing Agent for the Budd Company at Detroit. Mr. Clark company at Detroit, 1931 has held responsible positions in the Accounting and Purchasang Departments of the Budd Company for the past twenty-three

THE BUDD COMPANY DETROIT W MICHIGAN

August 3, 1953

Continental Screw Company Continental Screw Company New Bedford, Massachusetts

With reference to the Continental Screw Company, we must refute the state of the st Gentlemen:

sentatives show is greatly appreciated, You have a most helpful with, and cognizant of, our requests. It is hoped that "business as usual" will be the keynote in the years to come.

to come.

THE BUDD COMPANY

Clark urchasing Agent

JMC:mp



COUL COUL

Manufacturers of HOLTITE Fastenings For Every Purpose

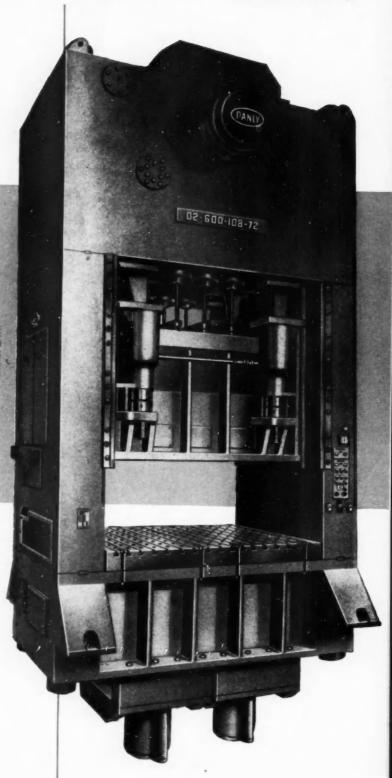
CONTINENTAL SCREW COMPANY, NEW BEDFORD, MASS., U.S.A.

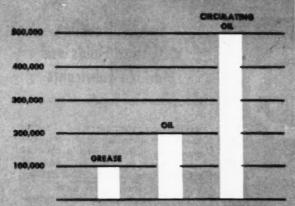
check your maintenance records!

DANLY

SAFEGUARDED BY AUTOMATIC OIL LUBRICATION

View of 600-ton Denly Double Action Press featuring entermatic oil fubrication to all wear points. Pressure typical permits automatic safeguerds against lubrication failure.





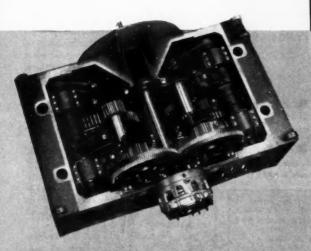
CIRCULATING OIL GIVES GREATER PROTECTION

Chart showing superiority of circulating oil lubrication for anti-friction bearings. Values at left represent bore of bearing in millimeters multiplied by speed in rpm... an accepted method for expressing limits of efficient bearing

PRESSES

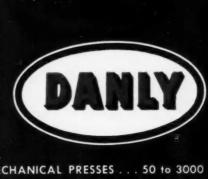
Actual day by day maintenance records in some of the country's biggest plants prove the importance of bearings in over-all press maintenance cost. The same records prove the cost advantages of Danly's automatic circulating oil lubrication system. Bearings wear longer because they run cooler and cleaner, continuously supplied with the proper amount of filtered off lubrication.

Routine maintenance is reduced because periodic oiling or greasing is eliminated. The hazard of lubrication failure due to neglect or breakdown is eliminated by automatic safeguards. For the best in presses, come to DANLY.



CIRCULATING OIL TO ALL ANTI-FRICTION BEARINGS

Danly first and second intermediate shaft and drive shaft bearings, indicated in color in this exposed crown view are all anti-friction type, lubricated by filtered circulating oil. Cooler, cleaner operation prolongs life.



MECHANICAL PRESSES . . . 50 to 3000 TONS HYDRAULIC METALWORKING EQUIPMENT



For complete details on outstanding Danly Press features . . . construction, drive, lubrication or operation . . . send for the Double Action Press Catalog today! Danly engineers are at your service.

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It costs less to run a DANLY PRESS!















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Special Handling of Cutting Fluids and Machine Lubricants

(Continued from page 33)

fluids; and the operating branch, headed by a coolant supervisor. The supervisor, together with a crew of men, works on the third shift at which time all cutting fluid changes and sludge clean-out are made.

One or more cutting fluids technicians, working with the chemist, are assigned to each shift to check cutting fluids, follow experiments, etc. Similarly, one or more coolant men, under the coolant supervisor, are assigned to the first and second shifts to take care of service and emergency

At the present time the company uses a range of some 12 different types or brands of cutting fluids. Now that the project is well under way, it is anticipated that the continuing study of specific applications will lead to the standardization of a smaller number of types of fluids and brands in the interest of simplification.

Continental also has recognized the important role of machine tool lubrication in the proper maintenance and extended useful life of production equipment. About 1300 machines are included in the new program and, according to a preliminary survey, they require a total of 11 different types or brands of oils and greases. Preliminary analysis divided the problem into three major activitiesmachine lubrication for normal operations, accessible points requiring frequent oiling; machine lubrication for hard to reach points requiring only weekly or monthly attention; and electric motor lubrication.

Because of the routine nature of normal lubrication of machine tools and motors, the servicing of these operations has been delegated to certain specified individuals as a part of their regular job. Lubrication of almost inaccessible points, on the other hand, has been given special attention and is being directed by a lubrication supervisor aided by a crew of 12 oilers. Not only is this number of oilers sufficient to handle all three shifts but it is anticipated that the group may be reduced in number as the system gains momentum and experience.

As mentioned above, Continental now uses 11 different kinds of machine lubricants. Ease of identifica-(Turn to page 115, please)

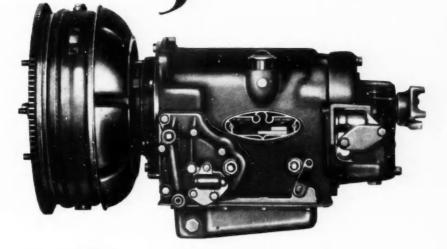


designed, engineered and built for

SMOOTH PERFORMANCE

MAXIMUM EFFICIENCY

TOP DEPENDABILITY



Detroit Gear AUTOMATIC TRANSMISSION

- Fast acceleration from standing start—with full utilization of engine power.
- Smooth performance in all speed ranges.
- Solid direct drive in high—no slippage.
- Exceptional rocking ability in snow, mud, slush or sand.

OTHER PRODUCTS BY DETROIT GEAR: TRUCK, TRACTOR AND BUS TRANSMISSIONS • TRACTOR AXLES AND HYDRAULIC PUMPS • GEARS AND PRECISION PARTS FOR CARS, TRUCKS AND TRACTORS

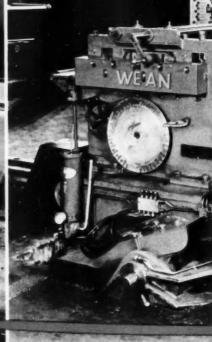


For further information, write, wire or phone

Detroit Gear

DIVISION OF BORG-WARNER CORPORATION . Detroit 14, Michigan

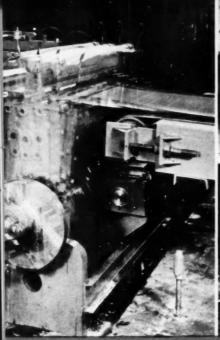


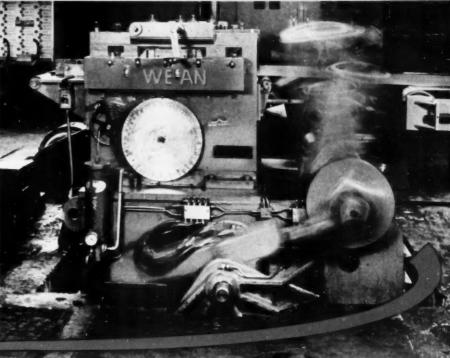


Here's the Amazing That Makes 100 Cuts Per Minute

Saves
Bulk Steel Users
\$20 a Ton

Wean salesmen have a quick and painless method for actually showing you, using your own figures, how, by purchasing steel in coil form, you can save in the neighborhood of \$20 per ton on your steel costs. This is an offer you can't afford to overlook. If your plant is situated in an area where a Wean Line is operating we invite you to see it in operation ... talk with the people who operate it ... and we're sure you'll want this great system in your own plant.





to Resquared Tolerance

One-hundred cuts per minute to resquared tolerances . . . that's what users of the amazing new Wean Equipment Flying Shear and Slitting System are getting. That's why, if you are using steel in sheet form, it's important to you to get all the facts.

By purchasing steel in coil form you eliminate all the expensive mill extras—that sometimes amount to more than \$1.00 per hundred weight. You reduce considerably both the personnel required to handle and inventory large steel stocks and the space needed to store various cut sizes

of steel of the same gauge and analysis.

And this Wean System provides you with faster production. Here is a shear line that will cut to tolerance at the rate of 100 times per minute. Measure this against your

present squaring-to-multiples rate and you'll quickly see how a single Wean line can keep a bank of high speed presses in constant operation.

NOW! THESE SAVINGS ARE EVEN MORE IMPORTANT

Rising costs are forcing steel makers to further increase the cost of extras. Some of these raises are already in effect. In the face of such action the Wean slitting and shearing line should now be even more important to you.





COMBINATION
SLITTING and
SHEARING

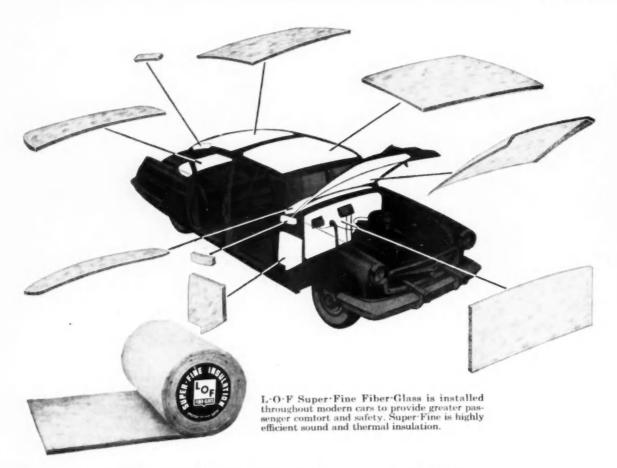
SYSTEMS

WEAN EQUIPMENT CORPORATION OFFICES

CLEVELAND

CHICAGO NEWARK, N. J. DETROIT

Cable Address: WEANCOR



Your final step in muting high-frequency engine noise!

The successful effort to quiet an engine begins with attention to moving parts, and ends with a blanket of LOF Super Fine Fiber Glass installed under the hood and on the fire wall. There are few owner satisfactions to compare with an engine that never speaks above a whigher

speaks above a whisper.
Inherently suited to those applications, L'O'F Super Fine muffles high-frequency engine noise, tire whine, airstream whistle, helps block heat passage into car body. The glass fibers resist fire, oil, grease and most acids.

Other applications of LOF Super Fine Fiber Glass—liners in roof, under package trays, on dash-board—further support your continuing effort to

offer customers engines that speak only in whispers and auto bodies that offer increased passenger comfort.

On your production lines, featherweight LOF Super Fine is easily handled, quickly applied without lost motion. Of course, it almost goes without saying that you can depend on Libbey Owens Ford, with its long automotive experience, to deliver top-quality Super Fine Fiber Glass right on schedule.

Super Fine Fiber Glass right on schedule.

For further information, call L·O·F's Detroit office, 610 Fisher Building, TRinity 5-0080. Or write us for the names of Hoodliner-Kit suppliers. Libbey Owens Ford Glass Co., Fiber Glass Division, 793 Wayne Building, Toledo 3, Ohio.

PIASKON DF

LIBBEY-OWENS-FORD GLASS COMPANY

FIBER-GLASS DIVISION

FIBER · GLASS

Cutting Fluids and Machine Lubricants

(Continued from page 110)

tion has been achieved by assigning a special decal design for each type; and wherever practical the specific decal is applied to the machine at each lubrication point, or as close to the lubrication point as possible.

Special forms have been prepared giving the inventory numbers of all machine tools, by their department location, which require daily lubrication or service; and a similar form for those requiring weekly lubrication or service. These forms are issued to the oilers as definite assignments and each item is checked off as the job is done. The oiler then returns the form to the supervisor for his file record.

A master file card system also has been set up, with a card for each machine on file in the supervisor's office, and a duplicate card attached to each machine. The latter serves as a guide for the oilers. The file record is expected to provide an excellent background for following the progress of machine lubrication and may eventually be useful in establishing specific machine lubrication work loads.

In any event, this formal system will assure proper lubrication of all equipment, with particular emphasis upon ordinarily inaccessible points and should result in considerable economy as well as freedom from break-down due to lubrication failures.

BOOKS ...

DREAM CARS, published by Trend, Inc., 1915 So. La Cienga Bivd., Los Angeles \$5, Calif. Price, \$0.75. With interest in automobiles at an all-time high, this book covers the history of cars from dreams to production. Included are chapters devoted to the finest masterpieces ever produced and fantastic designs for the future.

NATIONAL BUREAU OF STANDARDS 1952 ANNUAL REPORT, published by Government Printing Office, Washington 25, D. C. Price, 80.39. Summarizing scientific and engineering investigations conducted by NBS during the fiscal year 1952, this booklet contains accounts of current activities as well as more detailed descriptions of representative projects. Major fields of activity include the following: electricity; heat and power; atomic and radiation physics; mechanics; metallurgy; applied mathematics; electronics; ordnance development; and basic instrumentation.



CLEVELAND CONTAINERS

Metal End Fibre Cans for Unit Pack and Intermediate Packing...For both Military and Civilian Uses.

SAVE TIME in packaging . . . EXPEDITE repairs by having available spare parts needing frequent replacement.

These cans provide a continuous barrier and permit the reduction or elimination of preservatives and internal wraps.

MIL-C-12147(A)

MIL-C-5405

MIL-C-12804

Spare Parts and Supplies packaged in cans made under the above regulations meet all the requirements of Method 1A and Method 1C, Unit Packaging, under MIL-P-116A.

This packaging is approved and currently in active use by most of the technical branches of the government. It is in rapidly growing use, also, in many civilian applications.

Substantial savings are being made daily through the use of this method of packing. Write or call us . . . We will provide the technical help.



CALENDAR

OF COMING SHOWS AND MEETINGS

National Petroleum Institute, annual meeting, Atlantic City, N. J. Sept. 16-18

Truck Body & Equipment Ass'n annual meeting, Sheraton-Gibson Hotel, Cincinnati, Ohio...Sept. 21-23

Eighth National Instrument Con-

Second National Electrical Industries Show, 69th Regiment Armory, New York, N. Y. Sept. 29-Oct. 2

SAE National Aeronautic Meeting, Hotel Statler, Los Angeles, Calif. Sept. 29-Oct. 3

American Inst. of Electrical Engineers Aircraft Technical Conference, Benj. Franklin Hotel, Seattle, Wash. Sept. 30-Oct. 2

Paris Salon, FranceOct. 1-11

National Fluid Power Association, first Fall meeting, Sheraton Hotel, Chicago, Ill. Oct. 6-7

Eighth Midwest Quality Control

Conference, Masonic Temple, Davenport, Ia.Oct. 8-9 First International Engineers' Con-

ference, Rome, ItalyOct. 8-11
Automobile Old Timers' 14th Annual
Meeting, Hotel Astor, New York,

Society of Industrial Packaging and Materials Handling Engineers, annual meeting and exposition, Boston, Mass. . . Oct. 19-22

35th National Metal Congress and Exposition, Cleveland, O. . . Oct. 17-23

41st National Safety Congress and Exposition, Chicago, Ill....Oct. 19-23

Exposition, Chicago, Ill....Oct. 19-23
38th International Motor Show,
Earls Court, LondonOct. 21-31

SAE International Production Meeting, Royal York Hotel, Toronto, Canada.Oct. 29-30

American Society of Tool Engineers, semi-annual membership and board meeting, Dayton Biltmore Hotel, Dayton, O.Oct. 30-31

17th Annual Time and Motion Study and Management Clinic, Industrial Management Society, Sheraton Hotel, Chicago, Ill. Nov. 4-6

American Petroleum Institute Meeting, Hilton Hotel, Chicago, Ill. Nov. 9-12

gineers, annual meeting, Statler Hotel, New York, N. Y. Nov. 29-Dec. 4

1954

SAE Annual Meeting, Sheraton-Cadillac Hotel and Hotel Statler, Detroit, Mich......Jan. 11-15 National Motor Boat Show, Bronx,

National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y.....Feb. 17-19

SAE National Passenger Car, Body, and Materials Meeting, Hotel Statler, Detroit, Mich. March 2-4



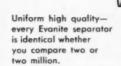
9612 West Jackson Boulevard, Bellwood (Chicago) Illinois

Branch Factory: Tyrone, Pa.

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EVANITE

the only battery separator with all these advantages!





Compare These Advantages of Evanite Separators

TESTED IN 20,000 VEHICLES for periods up to 3 years under actual operating conditions.

OUTSTANDING PERFORMANCE, equaling or surpassing conventional separators.

NO SPLITS, NO CRACKS—Completely uniform. No candling required.

NO TREATING, NO WET HANDLING

—Treated at the factory and shipped dry.

CUTS SHIPPING COSTS—Much lighter than ordinary separators.

ECONOMICAL—Cost no more than ordinary treated wood separators.

BACKED BY EXPERIENCE — Produced by Evans, whose years of experience are your assurance of finest quality.

Evanite is an improvement over nature! Wood has long been recognized as the most satisfactory low cost separator material. Now the new Evanite *interwoven wood fibre* separator utilizes wood in improved form. Evanite separators, tested in 20,000 batteries in daily use up to three years, have delivered more than their guaranteed battery life without a single separator failure.

Write today for full details on Evanite—Made only by Evans Products Company, Western Division, Dept. P-9, Plymouth, Michigan. Mills at Coos Bay, Ore.; Roseburg, Ore.; Vancouver, B. C.

Ask your battery manufacturer for complete product and case history information on the advantages of Evanite.

EVANS

WORLD'S LARGEST MANUFACTURER

OF BATTERY SEPARATORS





The Business Pulse

(Continued from page 78)

goods, whereas the 1952 increase was primarily in raw materials and goods in process.

It is true that year-to-year comparisons show no substantial rise in the ratio between inventories and sales, which is considered a significant indication of whether inventories are too high. Stocks at the end of June were about \$4.8 billion larger than on the corresponding date a year ago. During the same interval the increase in business sales amounted to \$5.3 billion, so that the inventorysales ratio remained about the same. This ratio, by historical standards, does not appear unduly high at present, although it might become so, either through a further increase in stocks or a decline in sales. It seems to be conceded that the recent rate of inventory accumulation is not likely to continue long.

As for the sales outlook, it is being pointed out that the rate of growth in both of the principal sources of consumer demand—income and credit—has shown signs of slowing down. This tendency creates doubt as to the ability of sales to keep pace with any further marked inventory accumulation.

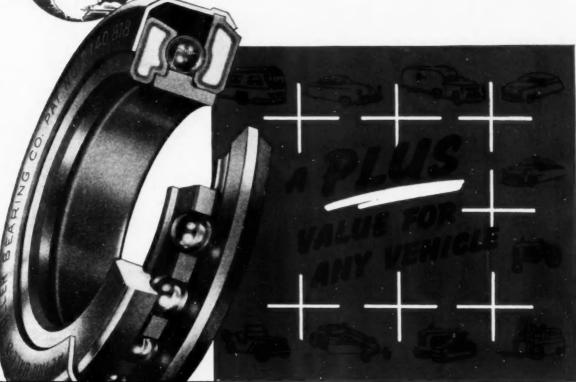
Prices Stable Since Korean Truce

The impression of stability in the general business picture is heightened by the even tenor of prices since the Korean truce was signed. The Guaranty Trust Company's wholesale price index registered a small gain between mid-July and mid-August, while the weekly index of the Bureau of Labor Statistics showed a fractional rise during the same period.

The money market has continued relatively tight, although there has been some improvement in banks' reserve positions. Except for moderate downward pressure on Treasury bill rates, yields on shore-term Government securities have registered little change. The market for intermediate and long-term obligations also has followed an even course.

With the 1954 appropriation bills passed and the revised budget estimate out, the fiscal position of the Government has begun to emerge more clearly. Congress voted a total of \$61.2 billion in authorizations for new expenditures. This is almost \$13





Plus VALUE FEATURES

T-shaped oil-impregnated bronze ball separator maintains perfect concentricity—eliminates eccentric thrust, excessive wear—assures the plus smoothness, quietness and endurance of bronze-to-steel contact.

contact.

Large, factory-packed grease reservoir assures lifetime lubrication—no need for costly grease fittings or oil lines.

* Special construction locks shell to free race, forming leak-proof joint. Lubrican't can't escape to clutch facings, never needs replenishment.

 Case hardened races for wearresistant working surface and tough, elastic, shock-absorbing core.



In 1953, as in the past 19 years more of the nation's mobile vehicles will be equipped with the Aetna T-Type clutch release bearing than with any other type. Its unrivaled service life has always made it the most economical in the long run. Once installed it is trouble-free, attention-free for vehicle life. Thanks to its design and lubricant capacity there's no need of costly machining operations for oil lines or grease fittings—no need for further maintenance whatsoever. Think what thatsaves in manand machine hours on the assembly line, in saving up-keep costs for the vehicle owner.

It's a trusty sign of dependability and economical performance in any vehicle—the famous Aetna T-Type bearing. Investigate. Find out the many other sound reasons it deserves a place in your specifications.

AETNA BALL AND ROLLER BEARING COMPANY
4600 Schubert Avenue Chicago 39, Illinois

In Detroit - Sam T. Keller - 2457 Woodward Avenue

billion below the amount recommended by former President Truman in January and about \$5 billion below the revised recommendations submitted by President Eisenhower.

Unfortunately, these cuts have not removed the threat of a substantial deficit for the current fiscal year. This is because so many of the Government's expenditures are of a longrange nature and are covered by appropriations made in earlier years and remaining unused. This backlog of "carry-over" funds on June 30, 1953, is estimated at \$81 billion. Most

of this total has been obligated—that is, contracts have been awarded, but the goods have not yet been delivered. As a result, cuts in appropriations are only slowly reflected in actual spending.

Small National Deficit Foreseen

Nevertheless, Secretary Humphrey believes that the nation has reached "the essential turning point toward a balanced budget." Present estimates indicate that the Government will spend \$2 billion less in this fiscal year than was forecast as recently as last May. Expenditures are now placed at \$72.1 billion and net receipts at \$68.3 billion, indicating a deficit of \$3.8 billion, far below the \$9.4 billion deficit for the last fiscal year. On the basis of past experience, an administrative deficit of the amount now indicated should be largely offset by receipts from Government trust funds and by other adjustments, leaving only a small excess of actual cash outgo over cash income, and possibly no such excess at all.

While greatly encouraged by these signs, Mr. Humphrey warns against setting too much store by them. The apparent progress toward a balanced budget could be upset by unforeseen demands upon the Treasury, such as unexpected developments abroad, heavy requests for domestic farm loans, or other unpredictable factors.

BOOKS...

RECOMMENDED PRACTICES FOR SPOT WELDING ALUMINUM AND ALUMINUM ALL OYS, published by American Welding Society, 35 West 35th St., New York 18, N. Y. Price, \$1.00. This is a manual of practical design and manufacturing data. Included is a table showing the combinations of aluminum alloys which can and cannot be spot welded. Mechanical cleaning and specific chemical cleaning methods are given for removal of surface oxide and foreign matter prior to welding. Complete welding schedules are given for frequency converter machines; rectifier machines; electromagnetic and electrostatic stored-energy machines; and standard ac machines. The electrical and pressure characteristics of these machines are illustrated and suggestions provided for altering the welding schedules for specific applications.

ENGINEERING ORGANIZATION AND METHODS, by James E. Thompson, published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 56, N. Y. Price, 56.00. This book provides workable techniques for speeding up production and reducing costs in product-design engineering departments. It gives practical methods of procedure to follow, which have proven effective in both large and small engineering sections of many technical concerns. Fundamental principles that can be modified to meet existing conditions and applied to every case are included—plus the complete data necessary, for the orderly preparation, processing, recording and release of engineering information. A useful general discussion describes the functions of supporting departments.

MAINTENANCE AND OPERATION MANUAL, published by the Electric Auto-Lite Co., Toledo 1, O. Price, \$1.50. This 178-page manual covers every phase of the complex automotive electrical system. It contains 230 illustrations, in addition to scores of colored wiring diagrams of the seven basic automotive electrical circuits. Information on some of the new 12-volt systems also has been added to this fourth edition.



"Wagner Air Brake Systems

provide adequate air for our hundreds of stops daily in Chicago metropolitan traffic"

says: H. L. WILLETT, JR. EXECUTIVE VICE-PRESIDENT

THE WILLETT COMPANY CHICAGO, ILLINOIS



October 10, 1952

Wagner Electric Corporation 6400 Plymouth Avenue St. Louis 14, Missouri

We lease heavy-duty tractor units to all types of haulers in the Chicago area. These units are in constant use and have to operate efficiently if we are to maintain our standards of service. Because of this we consider the air brake system of vital importance—it must be a safe system in operation, yet require a minimum of maintenance in our shop.

We specify Wagner Air Brakes when ordering new equipment because the Wagner Rotary Air Compressor, in our opinion, has the greatest air recovery and assures us trouble-free operation at all times. We know Wagner Air Brake Systems provide adequate air for our hundreds of stops daily in Chicago metropolitan traffic. Another of its principal advantages is the ease of installation-of its principal advantages is the ease of installation-off its principal advantages is the ease of installation-off its principal advantages is the ease of installation-off its principal davantages is the ease of the rotary air compressor. We have experienced little or no difficulty with the units we've installed. Such an outstanding record is the reason why we recommend Wagner Air Brakes and Wagner Rotary Air Compressors to owners of other heavy vehicles.

Sincerely yours,

Howard L. Willitt Fr.

H. L. WILLETT, JR. Exec. Vice-President

HLW.JR., jr

Truck Lausing Company . Willatt Transports Inc.

Men like Mr. H. L. Willett, Jr., have proven for themselves that WAGNER AIR BRAKES give them maximum freedom from maintenance worries and cut costly repair jobs on their brake systems. Much of the credit for this record of dependable service is largely due to the WAGNER ROTARY AIR COMPRESSOR -the compressor that assures an adequate supply of air at all times. Many fleets report that even after years of service they have never had a single compressor failure on units equipped with a WAGNER ROTARY AIR COMPRESSOR. Users like its simplicity of design, compactness of size, ease of installation, and economy.

If you install dependable, trouble free WAGNER AIR BRAKES as standard equipment it will help buyers of the vehicles you manufacture keep maintenance at a minimum. You can get full details on WAGNER AIR BRAKES by sending for your free copy of WAGNER Bulletin KU-201A. Mail your request today.



WAGNER AIR BRAKE USERS ARE OUR BIGGEST BOOSTERS

Wagner Electric Corporation 6363 PLYMOUTH AVENUE, ST. LOUIS 14, MO., U.S.A. (Branches in principal cities in U. S. and in Canada)

LOCKHEED HYDRAULIC BRAKE PARTS and FLUID ... NoRol ... CoMox BRAKE LINING ... AIR BRAKES...TACHOGRAPHS...ELECTRIC MOTORS...TRANSFORMERS...INDUSTRIAL BRAKES



AUTOMOTIVE INDUSTRIES, September 15, 1953

K53-3A



Yes, it's the modern way with the RANSBURG NO. 2 PROCESS, an amazing development in electrostatic spray painting.

Spray painting is no longer a hit or miss proposition. It's a science with the Ransburg No. 2 Process. There is NO OVERSPRAY TO BE EXHAUSTED...NO COMPRESSED AIR IS USED...NO OPERATOR SKILL REQUIRED.

Manufacturers of a variety of products report new efficiency percentages never before thought possible... efficiencies in the high nineties. With the RANSBURG NO. 2 PROCESS, they are getting increased production, higher quality work, and large savings in materials, manpower and money.

WHO CAN USE IT? Almost anyone who produces painted or coated products. Whatever your product might be, if your production volume justifies conveyorized painting, it's possible that the Ransburg No. 2 Process will do the job better . . . and for a fraction of your present costs.

May we send you a copy of our brochure which describes the Ransburg No. 2 Process in detail?

It also shows production installations in plants throughout the country.

INDIANAPOLIS 7, INDIANA

Q ELECTRO-COATING CORP.



The record 10 million tons of steel made in U. S. furnaces in March would make a solid block the size of the Empire State Building (37 million cu ft) and leave enough over for about a 4.5 million cu ft block.

Petroleum companies produced and delivered a record of 136,-532,246 gal of gasoline per day during 1952. This would be enough gasoline to drive one automobile for more than 376,122 years.

Petroleum power in the form of tractors, trucks, and stationary engines on U. S. farms provides a total of 178 million hp, about twice that used in American industry.

By 1965, statistics indicate that there will be some 107 million licensed drivers in this country or more drivers than there were people just 30 years ago.

When ten per cent is added to the equipped weight of a jet fighter: top speed decreases two per cent; range decreases 11 per cent; service ceiling drops 16 per cent; rate of climb falls 16 per cent; landing distance is lengthened 29 per cent; and landing speed increases five per cent.

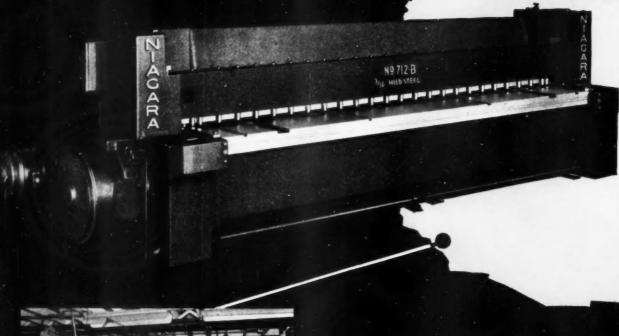
Motor vehicle registrations in Canada increased from 1.4 million in 1939 to three million in 1952. By 1978, it should exceed five million.

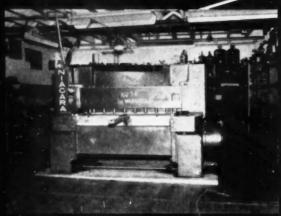
The U.S. produced 55.7 per cent of the oil in the free world in 1952.



MAGARA

SERVE INDUSTRY FROM





ELECTRONICS. Cutting .003" molybdenum to within .001" and ¼" copper with no change in set-up at a plant in California



DRUMS. Shearing sheets for drum bodies in Texas

NIAGARA MACHINE & TOOL WORKS . BUFFALO 11, N. Y.

SHEARS COAST TO COAST

* For high volume shearing applications, Niagara shears are preferred because of their:

> DEPENDABILITY ACCURACY LOW MAINTENANCE COST

A few typical installations are illustrated

Niagara builds more than 80 different sizes and capacities of squaring shears...one to suit every requirement of production, maintenance or warehousing.



ELEVATORS. Two of seven Niagara Shears n production at a large plant in New Jersey



of steel at a steel warehouse in Michigan



WAREHOUSE. Shearing thousands of tons of all kinds AUTOMOBILES. Continuous operation in a cut off line at a body plant in Western New York

America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work

DISTRICT OFFICES: DETROIT . CLEVELAND . NEW YORK . PHILADELPHIA

Dealers in principal U.S. cities and major foreign countries

New Defense Facilities

SUPPLEMENTING the list of Certificates of Necessity issued up to July 24, 1953, authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the August 15 issue, page 102, of AUTOMOTIVE INDUSTRIES, the following additional certificates were anounced by the Defense Production Administration, July 24, 1953, to August 10, 1953.

Included in this latest tabulation, 17,757 new or expanded defense facilities of all types have been authorized for rapid tax write-offs, the total amount eligible for amortization, being \$27,681,394,000. These figures are exclusive of cases that are up for -in these cases no dollar amount is listed. The figure appearing in parentheses is the percentage authorized for actual fast tax write-offs.

later review but included in this list

Regular Type LOCK NUTS



PALNUT Lock Nuts provide more advantages than any other locking method.

Highest Security

for vital

Bolted Assemblies

· Double locking action defies vibration

--- at Lowest Cost

· Much lower cost · Easy, speedy tightening with hand or power drivers . Require only 3 belt threads . May be removed and re-used.

PALNUT Lock Nuts for years have been used on connecting rods, main bearings, engine mountings, brake parts, body hold down, shock absorber mounting, trans-

mission housing, and many other critical assemblies in automobiles and trucks.

STUDEBAKER uses PALNUT Lock Nuts on connecting rads on all V-8 and six cylinder engines; also on front engine supports and other applications on its cars and trucks. Studebaker Commander V-8 Starliner



d for Bulletin #577 and free samples



The PALNUT Company 40 Cordier St., Irvington 11, N. J. Detroit: 730 West Eight Mile Road

Accurate Die Casting Company, Cleveland, Ohio

Compressor blades-\$278,000 (60)

- B -

Bendix Aviation Corp., Skinner Purifiers Div., Oakland County, Calif. Aircraft components - \$1,014,000

The George W. Borg Corp., Delavan, Wisconsin

Ordnance-\$17,877 (65)

The George W. Borg Corporation, Janesville, Wisc.

Ordnance-\$198,500 (55)

-c-

Cooper Precision Products, Los Angeles, Calif.

Precision fasteners for aircraft-\$20,000 (45)

Crandall Engineering & Mfg. Co., Dallas County, Texas

Aircraft parts-\$34,682 (70)

-D-

Decoto Brothers, Yakima, Washington Aircraft parts-\$74,000 (45)

Douglas Aircraft Co., Inc., El Segundo, Calif.

Aircraft & aircraft parts-\$135,809 (65)

Douglas Aircraft Co., Inc., Santa Monica, Calif.

Aircraft & aircraft parts-\$83,134 (65)

Food Machinery & Chemical Corp., San Jose, Calif.

Research & development for aircraft-\$75,000 (60)

Fries Tool & Mach. Works, Fort Wayne, Indiana

Aircraft parts-\$19,308 (70)

Haas Machine Company, Inc., Akron, Ohio

Aircraft parts-\$10,000 (45)

Hartwell Aviation Supply Co., Los Angeles, Calif.

Aircraft parts-\$35,000 (45)

Aircraft parts-\$30,586 (70)

Aircraft parts-\$11,823 (45)

Indiana Die Castings, Inc., Elwood, Ind.

Ordnance-\$8,996 (70)

Industrial Gear Manufacturing Co., Chicago, Illinois

Gears & gear drives-\$263,775 (70) (Turn to page 130, please)

...take your choice





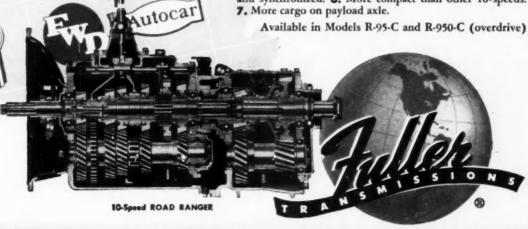
in all of these leading makes of trucks, you can specify the 10-speed, one-lever . . .

ROADRANGER

hite HENDRICKSON

Leading fleets have proved the Fuller ROADRANGER in gruelling service . . . and more and more fleets are specifying this 10-speed, one-lever transmission. Here's why:

1. No gear splitting—10 selective gear ratios, evenly and progressively spaced. 2. Easier, quicker shifts—28% steps—one shift lever controls all 10 forward speeds. 3. Higher average road speed—engine operates in peak hp range with greater fuel economy. 4. Less driver fatiguei. e. less shifting. 5. Range shifts pre-selected—automatic and synchronized. 6. More compact than other 10-speeds. 7. More cargo on payload axle.

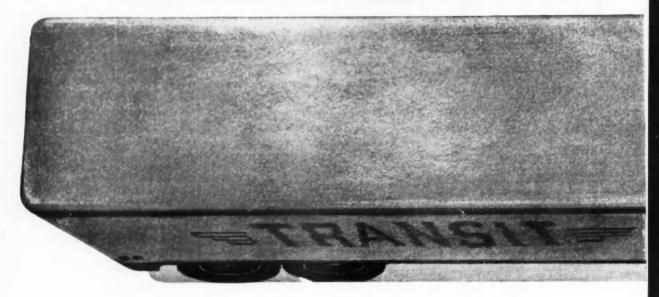


FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

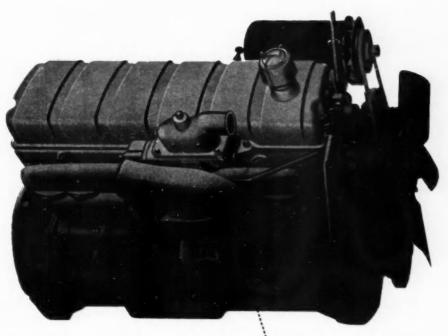
Unit Drop Forge Division, Milwaukee 1, Wis. . WESTERN DISTRICT OFFICE (SALES & SERVICE-80TH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

If you operate medium heavy-duty trucks ...

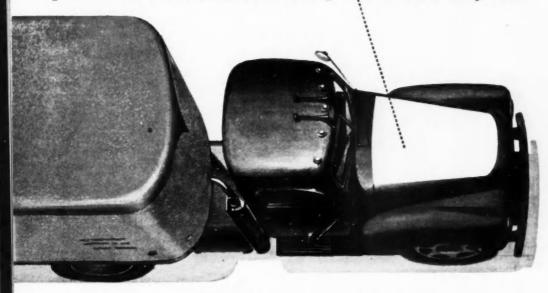
This new 150 h.p. diesel now makes Cummins







performance and economy available to you



It's Cummins new Model JBS-600—ready to serve in the medium heavy-duty trucks produced by leading manufacturers. Ready to bring to this field the performance that has made Cummins the leader among high-output diesels. 150 h.p., the JBS-600 delivers full rated power for faster acceleration... for reserve stamina when the going is tough.

JBS-600 operators report more miles per gallon . . . lower fuel costs. This demonstrates the fact that Cummins' exclusive fuel and injection system—together with four-cycle operation and use of inexpensive Number 2 diesel fuel — naturally leads to savings on the job. The JBS-600 is ready to work profitably for you. It's Cummins-engineered for a long and useful life.

For all the facts—see your Cummins dealer!

Cummins:

Engine Company, Inc. • Columbus, Indiana

Leaders in rugged, lightweight, high-speed diesel power

AUTOMOTIVE INDUSTRIES, September 15, 1953



Land-Air, Inc., Oakland, Calif. Electronic products-\$1,641 (70) Lockheed Aircraft Corp., Burbank, Calif. Aircraft & aircraft parts-\$43,120 Aircraft & aircraft parts-\$80,970

- M -Morgan Fabricators, Cleveland, Ohio

Ordnance parts-\$9,584 (70)

-N-

The National Supply Company, Torrance, Calif. Ordnance-\$400,000 (50)

-0-

The Oliver Corporation, South Bend, Indiana

Ordnance-\$47,522 (65)

The Oliver Corporation, Battle Creek, Michigan

Aircraft parts-\$39,720 (40)

Components for military end items -\$18,903 (55)

Aircraft parts-\$48,307 (65)

The Oliver Corporation, Springfield,

Ordnance-\$13,000 (65)

-R-

Ritepoint Company, St. Louis, Mis-

Ordnance & aircraft parts-\$427,-420 (40)

-5-

Schulz Tool & Mfg. Company, San Gabriel, Calif.

Aircraft parts-\$27,731 (70)

Solar Aircraft Co., San Diego, Calif. Aircraft components-\$277,232 (55)

Stewart - Warner Corporation, Lebanon, Indiana

Ordnance-\$520,977 (40)

-1-

Thompson Products, Inc., Cleveland,

Aircraft parts-\$864,473 (65)

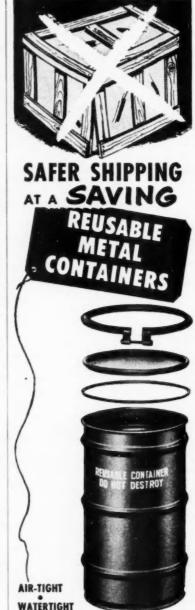
Turbine Products, Inc., Boca Raton, Florida

Aircraft parts-\$29,446 (70)

AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of **Automotive** and **Aviation**

MANUFACTURING



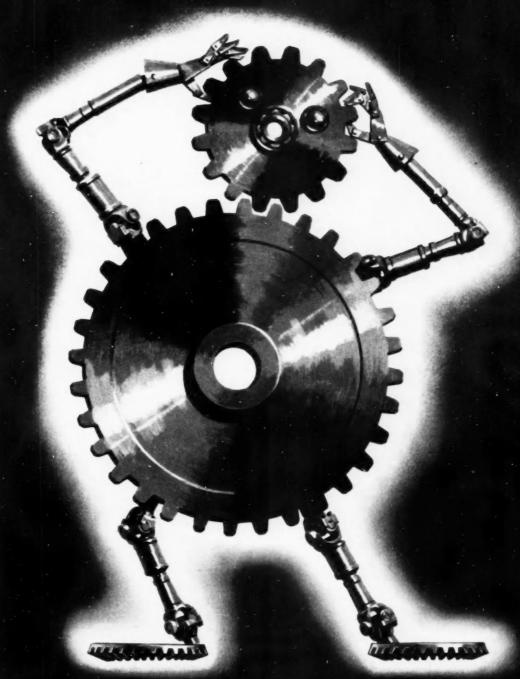
These sturdy, moisture-proof containers are ideal for shipment and storage of aviation, automotive and ordnance parts and supplies.

Made to rigid Air Force-Navy Aeronautical Specification MIL-C-6054A (formerly AN-C-152), they are available in 4, 6 and 7 gallon capacities.

Let us show you how you too can save with faster packing . . . safer shipping. Write or call today!

"It's Better to Ship in Steel"



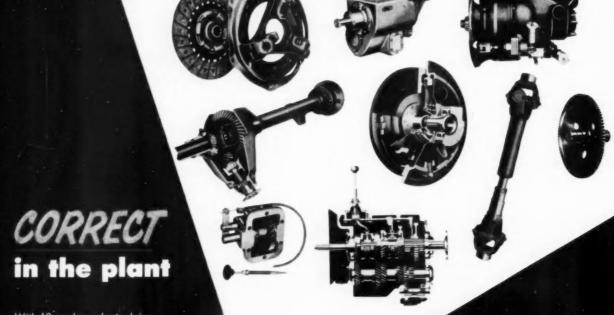


We specialize in making things come out right

Spicer has developed a fine balance between mechanical excellence and human efficiency during the past 50 years. This combination makes things come out right . . . in the plant . . . in the field. It is one of the big reasons why Spicer power transmission units have become the

Standard of the Industry





With 10 modern plants doing much of their processing from raw material to finished product . . . with engineering genius and manufacturing skill of the highest order . . . Spicer controls and maintains quality standards acclaimed in the industry.



Millions and millions of automotive vehicles of every type have proved the correctness of Spicer equipment with billions of service miles throughout the world. Spicer "follow-through" in the plant pays big dividends to the automotive manufacturer and his buyers . . . in performance and prestige.

SPICER MANUFACTURING DIVISION of Dana Corporation - Toledo 1, Ohio





ENGINEERING

DANA

MANUFACTURIN

TRANSMISSIONS + UNIVERSAL JOINTS - PROPELLER SHAFTS
+ BROWN-LIPE AND AUBURN CLUTCHES + FORGINGS +
AXLES + STAMFINGS + SPICER "BROWN-LIPE" GEAR BOXES
+ PARISH FRAMES + TORQUE CONVERTERS + POWER
FAKE-OFFS + POWER TAKE-OFF JOINTS + RAIL CAR DRIVES
+ RAIL WAY GENERATOR DRIVES + WELDED TUBING.

MEN in the NEWS

(Continued from page 25)

American Steel & Wire Div.-Charles W. Meyers heads the combined spring products and manufacturers products sales divisions.

Dayton Rubber Co.-R. J. Patrick has been named manager of truck tire sales

Lincoln - Mercury Div. - D. J. Bracken, formerly vice-president and general manager of Motor Products Corp., is now manufacturing manager. He succeeds R. P. Powers, who has joined Packard as vice-president for manufacturing.

Pheoli Mfg. Co. — Mason Phelps, Jr., was elected president succeeding John Slezak, who is Assistant Secretary of the Army.



Vanadium Corp. of America-William E. Mahin has been appointed technical director.

Firestone Tire & Rubber Co.-J. J. Robson is now manager of tire engineering and development. M. P. Hershey is manager of passenger, airplane, racing and special tire design, and T. A. Robertson is manager of truck, bus, tractor, implement and earthmover tire design.

Hydraulic Press Mfg. Co.-Dean M. Cochran is now assistant sales manager.

Dana Corp .- J. R. Miller is the new staff assistant to the executive vicepresident.

Willys Motors, Inc .- Four new vicepresidents are George L. Palmer, director of finance; Leland L. Lord, legal counsel; George J. Edellstein, director of purchases, and Leo Mc-Kay, special projects.

La France Automotive Fabrics, Inc. -John S. Grier, Jr., is now manager of the Detroit office.

Bristol Co. - F. W. Borchers has been appointed general sales manager. D. C. Sanford is now manager of the application engineering department.

(Turn to page 136, please)

The freezer's automatic The stove and TV too The washer shuts itself off Then starts itself anew

The car's a Mushomatic Eight Remote controlled by knee And who's in charge of all this stuff? Unautomatic me!

CASTINGS





If weight is a factor in the product you're in charge of purchasing, engineering or manufacturing, turn automatically to WELLMAN.

We've been in charge of producing castings on the lighter side, aluminum and magnestum, for almost half a century. Our four complete plants assure you the controlled quality and the easy machinability that help shut off your production problems.

Catalog No. 53 will fill you in on the details.

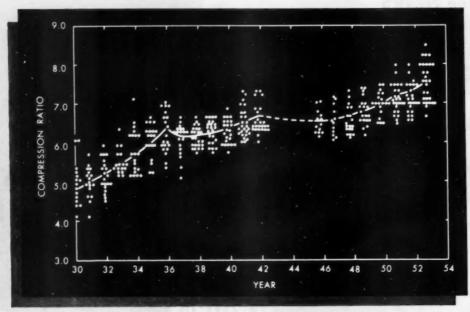
Well-Cast magnesium and aluminum castings Well-Made wood and metal patterns



MAN BRONZE & ALUMINUM CO.

Dept. 3. 12800 Shaker Boulevard

Cleveland 20, Ohio

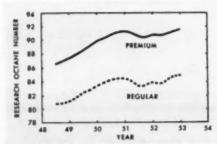


Increase in compression ratios of American passenger cars since 1930.

How does <u>Pre-Ignition</u> affect Future Improvements in Gasoline Engines?

The DU PONT PETROLEUM LABORATORY reports some significant findings on this important subject . . .

Pre-ignition, which is little understood at the present time, threatens to limit further improvement in the efficiency of fuel utilization in passenger car engines.



Recent trends in average research nethod octane numbers of regular and premium grade gasolines permitting increased engine efficiency.

The problem assumes increasing importance as the compression ratios of gasoline engines are pushed steadily upward (as indicated in the chart above), and the need for a solution becomes more pressing. There is, therefore, a growing demand for the cooperative development of suitable test methods which will enable the automotive and petroleum industries to study pre-ignition. Du Pont is helping in this.

WHAT IS PRE-IGNITION?

Pre-ignition may be defined as ignition of a gasolineair mixture in a combustion chamber by a hot surface before the spark plug fires.

Pre-ignition manifests itself in several ways. Here are three of the most important:

- 1. Wild ping—These loud, sharp and erratic cracks generally take place in one or two cylinders at low speeds either at part throttle or at full load.
- Thudding—This low-frequency vibration of the engine structure is caused by an extremely early ignition of the charge.

DUPONT SUPPLIES A COMPLETE LINE OF GASOLINE ADDITIVES
Tetraethyl Lead Compounds (Motor Mix—Aviation Mix) • Antioxidants • Metal Deactivator • Dyes
Also: Fuel Oil Stabilizer • Grease Stabilizers

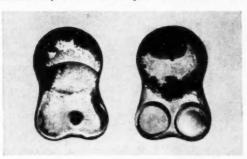
 Run-on or after-running—Continued engine operation after the ignition is turned off generally occurring when the switch is cut during idling or road operation under load.

Two of the important factors involved in preignition are the tendencies of combustion-chamber deposits to glow and cause surface ignition of the charge; and the ability of fuels to withstand ignition by hot surfaces.

DEPOSIT GLOWING

The glowing tendencies of deposits are dependent upon the rapid oxidation of carbonaceous materials at very high temperatures and under the catalytic influence of metal salts.

Glowing deposit particles exert pre-ignition harm either when attached to the combustion-chamber wall or while they are floating about as flaked particles in the working fluid for one or more cycles before they are blown out past the exhaust valve.

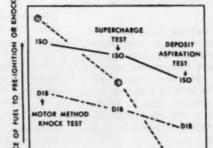


Flaked appearance of combustion-chamber deposit formed in a car operated for 5,200 miles under low-duty conditions.

Because glow must be present to cause pre-ignition, combustion-chamber deposits which are curled away from the walls and which can break off easily are more harmful than those that are tightly adherent. Such deposits are formed most readily under mild-duty operating conditions such as city driving.

ABILITY OF FUELS TO WITHSTAND

At the Du Pont Petroleum Laboratory several test procedures have been used for evaluating the preignition resistance of fuels in engines. When the composition of the fuels was varied over a wide range, from isooctane thru diisobutylene to benzene, pronounced differences in fuel behavior were exhibited. The relative rating of these fuels varied



ENGINE TESTS

NO SEVERE HOT SPOT ENERGY FROM PRE-IGNITION SOURCE

Effect of Hot-Spot Severity on Relative Ratings of Benzene, Diisobutylene, and Isoactane in Engine Tests.

with the test conditions, particularly in relation to variation in hot spot severity.

For example, with a very hot igniter, isooctane is best, diisobutylene is intermediate and benzene is poorest. However, with an ignition surface of intermediate severity, diisobutylene is worst and isooctane is best. With no hot spot at all, still a third order of rating was shown to exist. These findings are illustrated in the chart above.

While it has been found that pre-ignition tendencies of individual hydrocarbons vary quite widely in laboratory tests, the practical significance of this property has not yet been determined in extended road tests.

This work on pre-ignition is part of a continuing research program at the Du Pont Petroleum Laboratory. Since Du Pont is a major supplier of tetraethyl lead and other gasoline additives, the aim of this program is to help refiners improve fuel performance through the use of additives.



Petroleum Chemicals

E.I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division * Wilmington 98, Delaware

District Offices: NEW YORK, N. Y.—1270 Ave. of the Ams CHICAGO, ILL.—8 So. Michigan Blvd. TULSA, OKLA.—1811 So. Baltimore Aven Phone COlumbus 5-3620 Phone RAndolph 6-8630 Phone Tulsa 3-5578 Phone PReston 2857

IN CANADA: Conodion Industries Limited—Toronto, Ont —Montreol, Que —Calgary, Alto OTHER COUNTRIES: Patroleum Chemicals Expart—Nemours Bidg., 6539—Wilmington 98, Del

MEN in the NEWS

(Continued from page 133)

Boeing Airplane Co. — Edward C. Wells, vice-president, engineering, heads a new planning committee for research and development, and analysis of customer requirements. Members are John O. Yeasting, vice-president, finance; Fred P. Laudan, vice-president, manufacturing; and James E. Prince, vice-president, administration.

Raybestos-Manhattan, Inc. -- J. H. Matthews was named executive vice-president recently.

Westinghouse Air Brake Co.—Alexander T. Daignault has joined the firm as vice-president in charge of finance.

Solar Aircraft Corp. — Frank J. Hodnick is now the ceramic research engineer.

Joseph T. Ryerson & Son, Inc.—H. J. Holquist and E. J. Richardson have been appointed assistant managers of the cold finished bar division, under A. P. Beckloff, manager of the renamed tubular products and cold finished bar division.

Caterpillar Tractor Co. - A new Engine Div. will be managed by H. H. Howard. The new sales promotion department is to be headed by W. K. Cox. Manager of the domestic sales department is W. S. Zeigler. In the decentralized engineering department, G. E. Burks becomes director of engineering, John E. Jass succeeds him as chief engineer of the Peoria plant. Paul B. Benner and Carl L. Kepner become assistant chief engineers. At the Peoria plant Cliff Hathway was named employee relations manager. At the new York, Pa., plant W. E. Doersam was named manager of the parts department.

Pacific Airmotive Corp.—Roy Backman has been promoted to vice-president for product sales.

Electric Storage Battery Co.—Roland Whitehurst, vice-president and director is general manager of the new industrial products division. Robert L. Summerville, formerly assistant general sales manager, heads the new automotive products division.

Dominion Brake Shoe Co.—Thomas E. Akers is now chairman, succeeding M. N. Trainer, president of the parent American Brake Shoe Co. Kenneth T. Fawcett succeeds Akers as president, and Maynard B. Terry, also president of American Brakeblok Div., is vice-president.

Bohn Aluminum and Brass Corp.— David Walters is now chief industrial engineer.

Warner Div. of Detroit Harvester Co.—Carl L. Kalitta and C. R. Hohmann are now chief and assistant chief engineer respectively.

Willys Motors of Canada—Frank W. Freel was promoted to sales manager recently.

St. Paul Hydraulic Hoist Div.— Darwin S. Weist was appointed chief engineer.

White Motor Co.—Robert G. Oakley is now assistant to the vice-president in charge of sales.

Westinghouse Air Brake Co.—William D. Squires succeeds G. V. Myers as controller.

(Turn to page 138, please)



• In Flexon Thermostats the engine manufacturer gets a combination that is vital to his operation—a quality product backed by a reputable manufacturer with over 50 years manufacturing experience. Since 1902, Flexonics Corporation has specialized in the manufacture of products that utilize flexible metal elements. Since 1937, Flexonics Corporation has manufactured quality bellows. All the know-how accumulated over these years goes into every Flexon Thermostat. All the experience in meeting customers' specifications and production schedules has developed a policy of complete cooperation to help keep your output flowing smoothly.

We would like to have the opportunity to go over your needs with you and show you what Flexonics Corporation can do for you. Write, wire or phone to have your Flexonics sales engineer call.

Flexonics

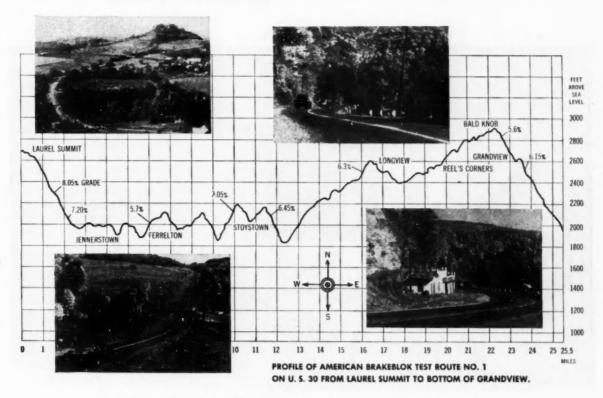
FLEXON BELLOWS DIVISION
Orporation 1396 S. THIRD AVENUE - MAYWOOD, ILLINOIS

FORMERLY CHICAGO METAL HOSE CORPORATION

Manufacturers of flexible metal hose and conduit, expansion
joints, metallic bellows and assemblies of these components.

To Canada: Flexonics Corporation of Canada. Ltd., Brampton, Ontario

TORTURE TRACK 25.5 MILES LONG!



... to develop the best brake lining for you

American Brakeblok Test Trucks follow this course daily. Under all conditions of load the lining is put through every possible test—performance, fade, recovery, moisture sensitivity, wear, glaze, and maximum heat resistance. Accurate instrumentation records test data for interpretation by our research staff.

The mountains of Pennsylvania were selected because of their sharp grades, long descents, hairpin curves and dangerous intersections, giving the best opportunity for testing brake lining through a wide range of operating conditions. On this track...today's brake linings are perfected—tomorrow's proven...for maximum safety, performance and life.



THE SAFETY BRAKE LINING

Copyright 1953, American Brake Shoe Company



AMERICAN BRAKEBLOK DIVISION

DETROIT 9, MICHIGAN

Plants in: Detroit, Michigan; Winchester, Virginia; Lindsay, Ontario; Gif, France







To turn out top quality production, take in top quality wheels... Simonds Grinding Wheels. They're second to none in quality, economy, dependability... and in the variety and completeness of the line they comprise. It includes grinding wheels, mounted wheels and points, segments and abrasive grain... everything you need for roughing, finishing, cutting off, sharpening, polishing. No matter what your jobs call for, call on your Simonds distributor for prompt service that gives you superior grinding wheel performance.

Write for free data book and name of your Simonds Distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES. CHICAGO, DETROIT, BOSTON

DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lock-port, N.Y. Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

MEN in the NEWS

(Continued from page 136)

Fruehauf Trailer Co. — Gordon E. Dean, former chairman of the Atomic Energy Commission, has been elected a director.

Thompson Products, Inc.—John F. Thurston has joined the firm as manager of the new market research department.

Gar Wood Industries, Inc.—Glenn C. Wilhide, retired commander of the Detroit Arsenal, was named manager of the Wayne Div.

Carboloy Dept., General Electric— Charles E. St. Thomas is now manager of advertising and sales promotion.

Oakite Products, Inc.—J. J. Basch is now manager of research and development, E. H. Steif was named assistant secretary and elected a director, and W. A. Baltzell is assistant sales manager of the industrial division.

Kellett Aircraft Corp.—Paul Luscusk has become commercial sales representative.

Tubular Products Div., Babcock & Wilcox—A. B. Capron is now assistant works manager of the tube mills and engineering, and Newell Hamilton was raised to manager of steel operations.

Chevrolet Motor Div.—C. A. Addison was named assistant general personnel director. At the new Forge Div. at Tonawanda, N. Y., J. L. Theis will be in charge. The new Foundry Div. is assigned to Clarence Qualman.

Sheffield Corp.—Earl J. Boyer has joined as application engineer for Measuray x-ray gage.

Chrysler Corp., Missile Branch— New appointments included C. Allen Brady, chief liaison engineer; John P. Butterfield, chief design engineer; Laurence M. Ball, chief laboratories engineer; Bernard J. Meldrum, staff engineer; Eugene M. Hicks, supervisor of administration; and Leroy E. Haggard, supervisor of procurement.

Republic Aviation International— Maj. Gen. Alden R. Crawford, USAF retired, was named general manager.

(Turn to page 142, please)

S·O·S Sign of Sincerity

mmimmmmmm

S.O.S Symbol of Service

MILLE COMMINICATION OF THE PROPERTY OF THE PRO

S·O·S for Springs of Satisfaction for over 45 years

mmmmmmmmmmmm

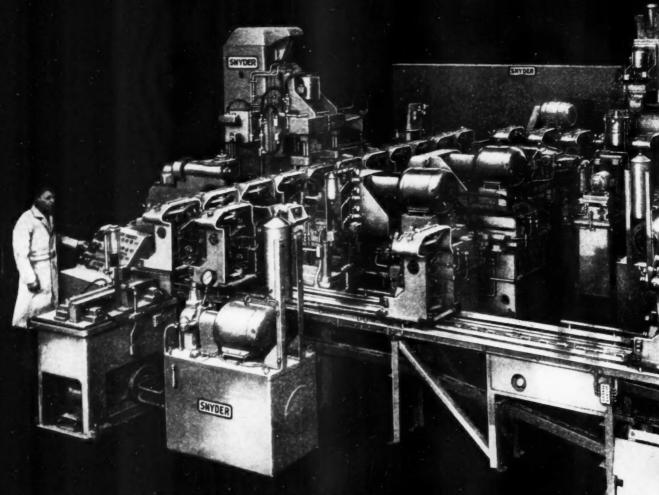


L. A. YOUNG SPRING & WIRE CORPORATION

GENERAL OFFICES • DETROIT 11, MICHIGAN

IN CANADA: L. A. YOUNG INDUSTRIES LTD. WINDSOR, ONTARIO

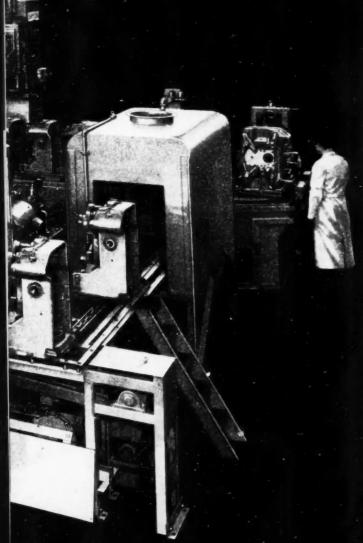
SNYDER MACHINES CONTROL COSTS

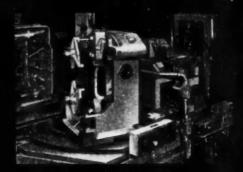


AUTOMATIC OPERATION

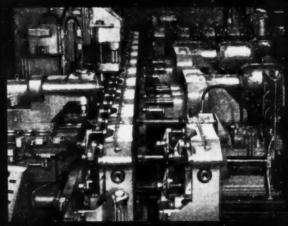
MILLS, DRILLS, TAPS, BORES, COUNTERBORES, COUNTERSINKS FRONT COVERS FOR AUTOMOTIVE ENGINES • AUTOMATIC INDEXING, LOCATING, CLAMPING, AND RELEASING • AUTOMATIC TRANSFER THROUGH TWO-STAGE, CONTINUOUS WORK CYCLE • AUTOMATIC CONTROLS • AUTOMATIC SAFETY INTERLOCKING SYSTEM • AUTOMATIC LUBRICATION • AUTOMATIC CLEANING AND CHIP REMOVAL • SKILLED OPERATORS NOT NEEDED

18 STATION AUTOMATIC TRANSFER 180 FRONT COVERS AN HOUR AT 100% EFFICIENCY





At Station 18 the fixture is rotated 90°, air wrenches unclamp the part so that it is easily removed. The fixture returns to Station 18, engages the return conveyor, is automatically blown clean and returned to the loading station.



Fixtures leaving Section 1 (above) move at right angle so that the other faces and top of the part are exposed to tools. The part enters the work cycle with three ground faces, leaves it ready for assembly.

SNYDER

3400 E. LAFAYETTE

TOOL & ENGINEERING COMPANY

DETROIT 7, MICHIGAN

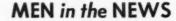
28 Years of Successful Cooperation with Leading American Industries

Canadian Automobile Show

Only Hudson Motors and Standard Motors (British) featured new 1954 cars at the international automobile show at the Canadian National Exhibition at Toronto, Aug. 28-Sept. 12. Hudson gave the first public showing on the continent of its new Hornet, Wasp and Jetliner cars, with six display models of various sedans and sports models. Prices were not available. The Toronto showing followed by two days the private dealer

show of the new models at Detroit. Standard Motors gave the first North American showing of its new Triumph sports car, with a price of \$2,295 at Toronto.

The first Canadian showing of the British Austin Healey sports car at \$3,125 was included in the showing of British and German cars which occupied the mezzanine of the Automotive Building at the Toronto exhibition, where close to three million people saw the cars during the two weeks of the show.



(Continued from page 138)

Russell, Burdsall & Ward Nut and Bolt Co.—Samuel N. Comly, vice-president and treasurer, has been granted leave of absence to serve as assistant administrator of National Production Authority.

Houdaille-Hershey Corp.—Appointment of W. L. Pinner as manager of the Process Development Div., and William J. Pierce as supervisor, has been announced.

Automobile Manufacturers Association—William B. Hankla is now director of information services. C. E. Howard, Jr., succeeds him as editor of Automobile Facts.

Chain Belt Co.—A. R. Abelt has been raised to vice-president of sales. George W. Woodland is manager of field forces, Gilbert J. Schuelke is sales manager of the Chain and Transmission Div., W. C. Messinger is assistant to the Construction Machinery Div. manager, and R. V. Krikorian is manager of the Ordnance Div.

American Standards Association— V. G. Grey is now a full time engineer in mechanical engineering and miscellaneous projects.

New Battery Plant

Gould-National Batteries, Inc., has acquired a 5½-acre site in Houston, Tex., on which construction of an automotive storage battery plant will begin next month. The new plant will cost about \$750,000 and have a capacity of 2000 batteries a day.

Viking Offices Move

Viking Products announces the removal of the Frostrode sales, special engineering and new development departments to 3066 E. Outer Drive, Detroit 34. Parke Kinietz, sales manager, said that the division, which manufactures and markets packaged mechanical refrigeration for industrial liquids, could better serve its customers in this new location.

Supplier Expands

Work has commenced on the construction of two plants for Ontario Steel Products, on a 70-acre site north of Milton. Besides the manufacture of leaf chassis springs, the two new buildings will house fully automatic nickel and chrome plating installations as well as light assembly lines.



The wide use of Lamb Electric Motors in aircraft components, home appliances, portable electric tools and other portable devices is impressive evidence of the fact that they combine thorough dependability with low weight.

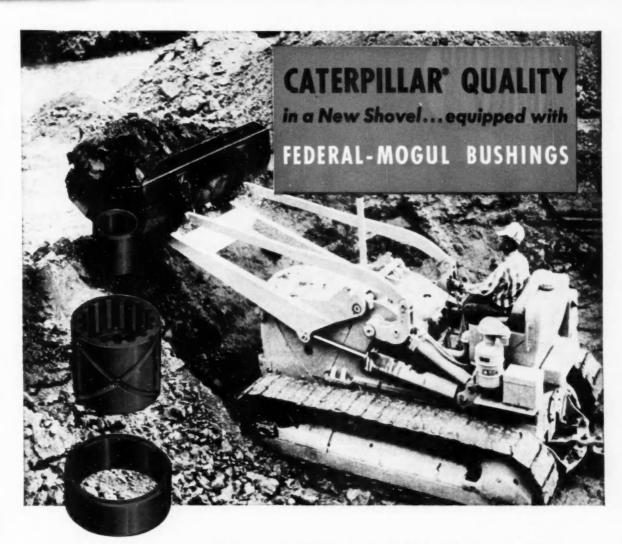
To obtain these and the other advantages of Lamb Electric specially engineered motors, it is important that the motor be considered while the product is still in the design stage.

The Lamb Electric Company Kent, Ohio

In Canada: Lamb Electric — Division of Sangamo Company Ltd.— Leaside, Ontario

THEY'RE POWERING AMERICA'S FINEST PRODUCTS







NEW TRACK-TYPE 2-YARD UNIT has Great Flexibility of Service

New advantages in digging, lifting, carrying and dumping are built into the new Caterpillar No. 6 Shovel. Balance, stability, high mobility and flexibility of service give it a wide range of usefulness.

The same quality characterizing its performance has been built into the Federal-Mogul cast bronze bushings designed and manufactured especially for this unit.

FEDERAL

FEDERAL-MOGUL CORPORATION, 11037 Shoemaker, Detroit 13, Mich.

Since 1899

Sleeve bearings in a wide range of designs and sizes; cast bronze bushings; rolled split-type bushings; bimetal rolled bushings; washers; spacer tubes; precision bronze parts and bronze bars. FEDERAL-MOGUL



• There's no doubt about it—without springs the mechanical world would be virtually paralyzed. For, like the human heart—in machine after machine, simple or complex, big or little the SPRING is the very source of motivation—the seat of power that propels . . . sustains . . . delays or stores up action.

For instance,—take any product which depends on a spring vital to its mechanism—very frequently a poorly designed spring will cause this product to fail in its performance, a headache for any manufacturer, AT THIS POINT—or even in the development stage while your production problem is still "HOT" is the right time to call in Automatic Spring Coiling Co., consulting engineers, trained in production methods and quality control, to bring ENGINEERING ABILITY to bear by providing the correct precision mechanical spring...at a minimum cost.

The successful manufacture and productive capacity in large quantities of automobile clocks, as well as, clutch thrust and driven plate springs, all manufactured to close tolerances . . . testifies to the reliable performance of the products of Automatic Spring Coiling Co., in this particular field. Automatic Spring Coiling Co. can supply compression, extension, torsion or double-torsion, helical springs of round or flat wire, flat spiral springs and flat or round wire shapes.

Why not let our experienced Consulting engineers survey your precision mechanical spring requirements without obligation—write today.



AUTOMATIC SPRING COILING CO. 4048 West Thorndale Avenue CHICAGO 30, ILLINOIS

Industry News

(Continued from page 82)

Grayed Colors Coming

Automobile colors next year will trend toward the "grayed" variety. Grayed colors differ from the high chrome type in that the sharp luster is reduced without affecting depth and quality. New models also will feature even greater matching of trim and exterior and possibly more limitation on the number of colors available, especially in certain deluxe models which may come in only one exterior color.

New Pontiac Series

Two major series, a practice which was abandoned with a 1949 model, may be offered by Pontiac in 1954. This may be Pontiac's answer to the Buick Special which is priced down practically into the Pontiac field at the moment. The added new series will be larger than the current Pontiac with a roomier body and presumably longer wheelbase.

Quality, Hydraulics Forums

The Eighth Annual Forum of Michigan Section, American Society for Quality Control will be held at the University of Michigan Sept. 19. Among speakers from the automotive industries listed on this program are: R. J. Cook, chief inspector, Oldsmobile Div., GMC; F. J. Meredith, quality control manager, Ford Cleveland Engine and Foundry Div.; Arthur Bender, Jr., quality engineer, Delco-Remy Div., GMC; H. L. Wherly, Dow Chemical Co.

The Ninth Annual National Conference on Industrial Hydraulics, sponsored by the Graduate School of Illinois Institute of Technology and the Armour Research Foundation of I I T, will be held Oct. 8 and 9 at the Hotel Sheraton in Chicago. Sessions on automotive, presses, pumps, aircraft, machine tools and tractors are included.

More Radiators

A new industrial expansion program is underway at the Mattoon, Ill., plant of the Young Radiator Co. Home offices and main plant are located in Racine, Wis. The new construction involves 20,000 sq ft, one-floor structure adjoining parent buildings at Mattoon.

(Turn to page 146, please)



CUSTOM-BUILT battery

⚠ Globe-Union batteries are creatively engineered for original equipment manufacturers. (As well as numerous private brands.) They are also produced for mass merchandising under the name GLOBE "Spinning Power".

For low freight costs and fast service, there's a Globe-Union factory located near your major markets (see below). And, to provide better service to the great Southwest, we've added a new plant at Houston, Tex.



SPLIT - SECONÓ STABTIMO

MILWAUKEE 1, WISCONSIN

GLOBE-BUILT - IT'S RIGHT FROM THE START!

- Battery Plants at: ATEANTA, GA. BOSTON, MASS. CINCINNATI, CHIO DALLAS, TEXAS EMPORIA, KANSAS HASTINGS-ON-HUDSON, N. Y. LOS ANGELES, CALIF. MEMPHIS, TENN. MINERAL RIDGE, CHIO OREGON CITY, ORE. PHILADELPHIA, PA. REIDSVILLE, N. C.

Industry News

(Continued from page 144)

British Output Up; 1952 Exports Shown

The rate of car production in British factories again shattered all previous records in July with a new all time peak weekly average of 13,-200 units. Output of commercial vehicles, nearly 4600 a week, was slightly more than the average for the previous three months.

Another big advance in car exports brought the July shipments above 32,000. Exports of commercial vehicles, 11,400, were the highest since May 1952 and nearly 3000 more than in June.

The important component of motor vehicles of total engineering exports of the three major producers is stressed by the British Treasury in a recent bulletin. Passenger cars and commercial vehicles are shown to comprise over one-fourth of the U.K.'s engineering exports, about

one-twentieth of the U. S. total, and about one-seventh of Germany's. But while the share of Germany rose during last year, overseas sales of Britain and the U. S. fell. The following table, showing the distribution of vehicles exports by market areas, is part of an analysis of the current contraction of British engineering exports:

To	From	(thousands) 1952 (1951	
U. S. A. and Canada	U. K. Germany U. S. A.	55 2 18	51 1
Central and South America	Germany U. S. A.	24 13 164	29 15 251
Sterling Area	Germany U. S. A.	231 8 31	321 8 39
Non-Sterling Area and possessions	U. K. Germany U. S. A.	101 101 52	84 86 76
Rest of world	U. K. Germany U. S. A.	27 11 36	21 9 49
Total	U. K. Germany U. S. A.	438 137 297	506 119 434

Canadian Sales Trail U. S.

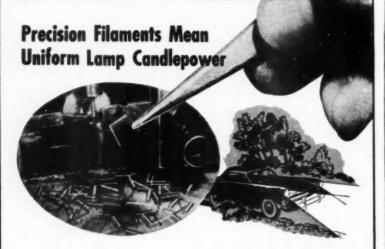
Canadian car dealers sold 274,039 new cars valued at \$687,883,412 in the first half of 1953, up 29 per cent from 212.566 sold in the first half of 1952 for \$538,433,773, according to figures of the Dominion Bureau of Statistics, Ottawa, released at mid-August. The 274,039 new cars sold in 1953 consisted of 214,054 passenger cars and 59,985 commercial cars. Of the total 102,217 cars were sold on instalment terms, an increase over such sales last year. The apparent supply of new vehicles available in Canada rose even greater, up by almost 36 per cent to 286,150.

A bigger proportion of the vehicles available were Canadian-made. They numbered 252,186, against 184,373 for the corresponding period of last year, an increase from 87.6 to 88.1 of the total. U. S. sales up some 36 per cent this year.

Mexico Woos Mercedes

German cars and machines will be assembled in Mexico if an accord is reached shortly. This information was revealed in connection with the forthcoming German industry exposition to be held in University City in Mexico City. Details of the agreement are still in formulative stages, but it is understood manufacturers of the Mercedes Benz line are eager to set up an assembly plant in the Republic. It is pointed out that before the war Mexico did a \$100 million a year export business with Germany, whereas

(Furn to page 148, please)



Safety on our highways after dark depends mainly on the illumination provided by the headlamps of cars, trucks and buses. One of the many critical operations in the making of lamps capable of delivering correct candlepower, is filament winding.

The picture shows tungsten wire filaments for Tung-Sol lamps being wound and shaped automatically to microscopic tolerances by high speed machines. This is the manufacturing tempo by which Tung-Sol supplies millions upon millions of lamps of every type to the automotive industry.

Although volume is essential, quality always comes first with Tung-Sol. Rigid production and quality control procedures hold Tung-Sol lamps to standards for uniform electrical and light characteristics that are unsurpassed in the industry.

Tung-Sol will gladly assist you with any miniature lamp appli-

TUNG-SOL ELECTRIC INC., Newark 4, New Jersey
Sales Offices: Atlanta, Chicago, Culver City (Los Angeles), Dallas, Denver,
Detroit, Newark, Philadelphia, Seattle.





Actually, it was less than an ounce of aluminum ... five hundredths of a pound to be exact ... that Alcoa engineers added to this piston's weight. But this, plus the half century of knowhow these men possess, produced a piston with 20% greater load-carrying ability! Life expectancy of the engine was greatly increased!

To simulate many actual running conditions, Alcoa technicians turned to their Fatigue Testing Machines. Here they mounted the piston in position... brought it to operating temperature... then jolted it to destruction. By carefully checking it at all stages, they evaluated the piston's design characteristics, alloy and heat treatment. A slight design change—a bit of extra metal, and another job for Alcoa's Research and Development Divisions was stamped "Complete".

Facilities such as the Fatigue Testing Machine are a regular part of our service... to be called upon when special equipment is needed. If you have a particularly tough application, and would like more information on all of Alcoa's facilities, call your nearby Alcoa sales office, or write: Aluminum Company of America, 1841-J Alcoa Building, Pittsburgh 19, Pennsylvania. There's absolutely no obligation!

Alcoa (). Aluminum

ALUMINUM COMPANY OF AMERICA



Wheel Testing Machine, built by Alcoa, for testing various types of automotive and aircraft wheels.



Whirl Pit, capable of rotating parts up to 80,000 rpm, handles pieces up to five feet in diameter.



Electric dynamometer measures engine output.



Electron microscope serves an important function by giving magnification of 100,000 diameters.



Manufactured under patent license from General Motors Corporation.

NEW...the BRUSH SURFINDICATOR*

a practical shop tool for measuring surface roughness

With this new, portable inspection tool you can make surface roughness measurements on the production line. The operator merely guides the pickup over the piece to be inspected and then reads surface roughness in average microinches on the meter.

The SURFINDICATOR is always reliable because the unit is equipped with a set of Precision Reference Specimens. These permit checking accuracy of the instrument at any time and provide a set of standards for absolute calibration. Using SURFINDICATORS, several plants in different locations can all produce parts to the same surface roughness specifications. Get the complete story on the SURFINDICATOR now! *Trade Mark

BRUSH ELECTRONICS

INDUSTRIAL AND RESEARCH INSTRUMENTS PIEZO-ELECTRIC MATERIALS . ACOUSTIC DEVICES MAGNETIC RECORDING EQUIPMENT ULTRASONIC EQUIPMENT



COMPANY

formerly
The Brush Development Co. Brush Electronics Company is an operating unit of Clivite Corporation.



BRUSH ELECTRONICS COMPANY, DEPT. DD-9 3405 PERKINS AVENUE . CLEVELAND 14, OHIO

Please send bulletin on the Surfindicator. Name

Company

Title

Address

State

Industry News

(Continued from page 146)

last year exports were only \$20 mil-

The Department of National Economy has set up quality standards for the brake fluid industry in Mexico. This is hailed as the coming of age of an industry which first saw the light only two years ago. A half-dozen plants produce brake fluid now but in the past there was a lack of consumer guarantees as a result of an unregulated industry.

An acceleration device, which eliminates the need for use of right foot in feeding gas to engine, is on sale in Mexico City auto supply stores and can be connected readily by a mechanic. The speed desired by the driver is set by the device. It disconnects automatically when the clutch or brake are engaged.

The Mexican national tire industry imported, during the first five months of this year, 5,676.3 tons of rubber valued at over \$3 million. Principal suppliers were Canada, the U. S., Holland, Malay States, Ceylon, French Indochina and Germany, with major part of imports coming from the United States.

Canadian Defense Orders

An order for fire engine trucks with pumpers to Pierre Thibault, Pierreville, Que., amounting to \$674,-774 was largest single order in the automotive field awarded during July 16-31 period by Canadian Department of Defense Production, Ottawa. Orders for automotive parts and equipment during the period totaled \$2 .-096,000. Other large orders were to Bickle-Seagrave Ltd., Woodstock, Ont., for crash truck bodies for \$478,-560; to Canadian Traction Ltd., Windsor, Ont., for truck chassis with cab totaling \$192,800; to Four Wheel Drive Auto Co. Ltd., Kitchener, Ont., for trucks amounting to \$276,000; and to Hayes Manufacturing Co. Ltd., Vancouver, for tractor trucks amounting to \$163,636.

New Paint Plant Name

With the announcement of completed plans for a new and modern paint plant, now being built to replace the fire-ruined 55-year old Standard Paint and Varnish Co. of Windsor, Ont., came a further report that the company name would be changed to Rinshed-Mason Co. of Canada, Ltd.

(Turn to page 151, please)

There's gold for you in "them thar" Coils!



Suveneer CLAD METALS

Superior Steel

CORPORATION

CARNEGIE, PENNSYLVANIA

Prospecting for more profitable product fabrication? You're in luck when you find how SuVeneer Clad Metals pan-out on your applications . . . in savings of expensive non-ferrous materials, in ease of fabrication, and in improved product performance. SuVeneer Clad Metals are composites of genuine copper, or brass, or nickel, bonded inseparably to plain strip steel on one or both sides. • You save from 70% to 80% of the solid strategic metals, while enjoying all their surface advantages. Write!

THE JOBS

YOU RETRENCH ON STAMPING COSTS WITH HENRY & WRIGHT DIEING MACHINES

In the small area occupied by a compact Henry & Wright Dieing Machine you have a production tool equal in capacity to five or ten conventional presses. Progressive stamping on a Henry & Wright really pays off, because this press is specifically designed for this type of work.

Angular thrust is not transmitted to the upper crosshead. Low center of gravity holds vibration to an absolute minimum. Long ways, plus four post guidance and a pulling instead of pushing stroke, serve to strait-jacket punch travel. Accurate punching produces high quality work and a lot more of it between die grinds. Much less metal is removed when dies are ground.

Get the whole story about the Henry & Wright Dieing Machine - the economies you achieve in die life, inspection, toting, operators. Retrench by modernizing with Henry & Wright.



Refrigerator part produced at speed of 65 strokes per minute of .060" cold rolled steel on 100-ton Dieing Machine.



Hemispherical shell 2" deep produced at speed of 60 strokes per minute.

Paired sections of housing produced of .065" hot rolled steel at 60 pairs per minute.



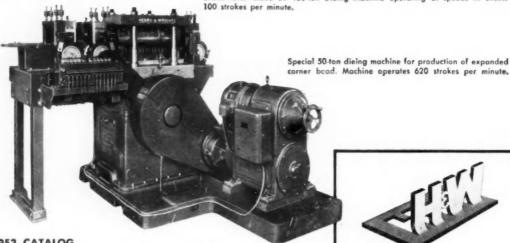
Radiator fin of copper made three at a time at speed of 85 strokes per minute.



Radio part produced one per stroke at speed of 300 strokes per minute.



Brake lever made on 150-ton Dieing Machine operating at speeds in excess of



1953 CATALOG

Write for your copy on company letterhead to Henry & Wright, Division of Emhart Mfg. Co., 491 Windsor St., Hartford, Conn.



DIVISION OF EMHART MFG. CO.

Only the best is good enough

Industry News

(Continued from page 148)

Construction is underway at the site of the old plant at 845 Wyandotte St., Windsor.

Production is expected to be resumed in Windsor by December, 1953. Final construction is scheduled for completion in February, 1954, enabling R-M to approximately double the former output of household, automotive and industrial, railroad, marine, commercial maintenance, and other type finishes. New lines of specialized industrial and military finishes will be added. Total rebuilding, estimated at \$1 million, will include over 50,000 sq ft of floor space.

Computer Service

High-speed computation services, performed automatically on the Burroughs Laboratory Computer—Model I are now available to business, manufacturing, trade and scientific organizations at the Philadelphia Research Center of Burroughs Corp. (formerly Burroughs Adding Machine Co.).

Developed and improved over the last two years for laboratory study, this electronic digital computer has been proved on a regular schedule of computations originating primarily within the Burroughs Research organization, located at 511 N. Broad St., Philadelphia 23. Test problems for outside organizations have included turbo-engine design and performace calculations; pipe stresses for chemical processing plants; optical ray tracing; antenna calculations; and statistical correlations. The machine is similar to the one installed at Wayne University, described in AUTOMOTIVE INDUSTRIES for Sept 1, page 52.

An expanded programming staff now permits the handling of exploratory problems for other business, manufacturing, trade and scientific groups which wish to evaluate the use of electronic digital computers. Cost runs to \$50 per hour for machine time and \$6 for programming.

New Side Dumper

A new special side dump body is announced by The Galion Allsteel Body Co. This is said to be the first side dump body to employ double lift arm action on a standard dump truck application. Bodies can be made from eight to 10 ft in length, with capacities of three to six cubic yards.



Plus Fabricating of our own tubing Michigan is interested ONLY IN THE FABRICATION OF Stainless steel, copper, brass and aluminum tubing.



AIRBRIEFS

(Continued from page 80)

bining or dissolving existing interservice agencies of procurement, production and distribution; eliminate unneeded duplication and spending in the supply and logistics fields; determine relative priorities of items procured by the Army, Navy and Air Force; review military requirements for basic materials; make recommendations on joint purchasing of items

used by all the services; devise policies covering procurement scheduling and planning and appraise strategic plans in terms of available materials, end items, components and support, thus helping to modify strategic plans.

Tramp Airplanes

In the intercity trucking business, many trucks get figuratively lost in a maze of leases, sub-leases and subsub-leases to the point where a truck may pass through a half-dozen hands to its present operator, all the while being actually owned by somebody else. The first vague signs of this pattern being developed in the air trucking business are appearing. It was pioneered in the non-scheduled airline business as a device to avoid compliance with Civil Aeronautics Board orders to "cease and desist." When a nonsked received such an order, he simply "leased" his airplane to a new company and continued operation for the three-six months it required the CAB to get out a new order. Now, however, certificated airlines are deep in the practice. Leading the parade is Robert Prescott, president of Flying Tiger freight line, who recently leased four Douglas DC-6A transports to Northwest Airlines before the airplanes had even been delivered. Prescott previously had leased DC-4 transports to trans-Pacific and Far East airlines at various times. There are now suggestions that Prescott may be one of the first to order jet transports from a U. S. manufacturer and lease them to various airlines. Such a method insures Flying Tiger of the lease income and relieves the lessee of the heavy expenditure of capital for the planes.



Closer Tolerances in CERAMIC Parts

Frenchtown's new grinding set-up insures meeting your specifications for precision ceramic parts to the thousandth of an inch. These machines are helping us help you to design for more effective use of ceramic components that give you high

Top: A corner of the grinding department

In circle: Grinding two sides of a ceramic bushing in one operation

dielectric and mechanical strength and resistance to heat shock for critical, high voltage applications.

Parts are ground at high speeds to assure ample production for your volume orders. Operations include straight infeed and traverse grinding; forming tapers and beveled edges; and grinding parallel surfaces at one time.

Get in touch with Frenchtown engineers—or send us your blueprints and quantity requirements for an estimate.

FRENCHTOWN PORCELAIN CO.

81 MUIRHEAD AVENUE

TRENTON 9, N. J.

Jet Maturity

Even jet experts themselves raised an eyebrow when C. W. LaPierre, vice president of General Electric's Aircraft Gas Turbine Division, revealed that "Some G-E jet engine models have 1200 hours allowable operating time between overhauls." This significant figure is substantially higher than the 1000 hours allowed by the Navy on other jet engines but which have not, in fact, been attained. The 1200-hour figure rates with the best piston engines of today and is considerably higher than most of them. Thus, the turbojet engine apparently has licked its last major shortcoming - durability - and is now fully competitive with the 50-year-old piston engine on the scores of power and durability. Only remaining disparity is specific fuel consumption but the different definitions involved can be twisted to show the jet even more economical than the piston engine at sonic speeds or higher. (Piston engines use lb fuel/hp whereas jets use lb fuel/lb thrust. Since one lb of thrust equals one hp at 375 mph, it is the equivalent of two hp at 750 mph. Present jets run about 1.0 lb/lb and this reduces to only 0.5 lb/hp at 750 mph, about the same as a piston engine.-Ed.)

(Turn to page 154, please)

CUT MILLING COSTS WITH

Speed and accuracu!

More and more-Kent-Owens Machines get the call for countless milling jobs today—because they're rugged . . . simple . . versatile. Twin-post head mounting assures balanced load. Greater cutting efficiency-only two gear contacts, motor to cutter. Write for bulletins on wide range of hydraulic and handoperated machines. Also, let our engineers help you with tooling and special machine requirements. Kent-Owens Machine Co., Toledo, Ohio.





No. 2-20V

20"table travel... vertical spindle with speed range 32 to 1284 R.P. M.... 42" x 12" table.



No. 2-20DS

Double Spindle for two milling operations at same time...20" table travel . . . 42" x 12" table.



Double Spindle for two milling operations at same time ... 14" table travel ... 32" x 9" table.



matic



No. 1-M

Hand feed to table and head . 25" x 9" table . . . Ad-justable head counter-balance.



No. 1-V

Hydraulic vertical head feed ... 5 1/2" head travel 9" table.



No. 1-14

32" x 9" table . 14" table travel . . . hydraulic table feed full automatic cycle.



Call on

for milling machines

8" table travel . x 9" table automatic hydraulic table feed.



KENT-OWENS REPRESENTATIVES

BOSTON al Machinery Corr BUFFALO

DALLAS Machine Tool Co. DAYTON Mach'y Co DETROIT

PT. WAYNE GRAND RAPIDS

HAMILTON, ONT. F. F. Barber Mach'y HARTFORD

HOUSTON Oliver H. Van Horn Co., Inc.

INDIANAPOLIS Outis Machinery Co. KANSAS CITY Eichman Machinery Co.

LOS ANGELES Germain Mach'r Co.

MILWAUKEE Four States Mach'y Company MINNEAPOLIS
The Satterles Company

John J. Normoyle Co. F. F. Barber Mach'y Co.

NEW ORLEANS Oliver H. Van Horn Co., Inc.

NEW YORK Harrington-Wilson-Brown Company PHILADELPHIA Calco Machinery Compa

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F. W. Schiefer Machinery Co.

SAN FRANCISCO C. F. Buloni Machinery Co.

ST. LOUIS Blockman & Nueszel Mach'y Co Clarke Equipment Company J. F. Gwees Mach'y Company

F. F. Barber Mach'y Comp

WALKERVILLE, ONT.

From Atomic Energy Plants
to Rotogravure Presses . . .



From Power Plants to
Perfume Producers . .



... 42 Stories above

Manhattan . . .



Deep Down in the Earth . . .

wherever hazards are tough or unusual ...

CARDOX experience means dependable FIRE PROTECTION

When you buy fire protection, take a long, hard look into the experience of the people who plan and engineer it. It may mean your business survival—and the best way to judge is by what they've done!

CARDOX' experience in fire protection by low pressure carbon dioxide is on the record for all to see. For example, CARDOX Systems and Equipment* are protecting:

Vital equipment in atomic energy plants.

Much of the equipment in 14 of the nation's 25 largest utilities.

Practically all U.S. jet engine test cells.

The world's first continuous seamless pipe mill.

A radio station 42 stories above Manhattan.

Precious records in a deep underground vault.

The world's largest rotogravure press.

Even the ingredients of a perfume producer.

The list could be expanded indefinitely. This broad "know-how" of CARDOX—based upon thousands of successful Systems, plus years of research-is the priceless "extra" you don't pay for in every CARDOX System. Why not write to see how we can help you?

*Covered by Patents, Issued and Pending

CARDOX ORIGINATOR OF LOW PRESSURE CO.

FIRE EXTINGUISHING SYSTEM

CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS
Offices in Principal Cities

AIRBRIEFS

(Continued from page 152)

Pride Costs Delay

The present delay in delivery of Republic F-84F Thunderstreak jet fighters can be chalked up to British pride -in a way. Although Republic is producing the fast, swept-wing fighters on schedule, they are piling up in the company's backyard awaiting delivery of Wright J65 turbojet engines. These are U. S. versions of the Armstrong-Siddeley Sapphire engine built under license. Wright was getting into good production on the engines and the F-84F's were flying when trouble developed with the aluminum compressor blading. The engines were called back and Wright underwent a development program leading to replacement of the blading with stainless steel blades. This new version is now in quantity production and deliveries soon will permit the Air Force to fly away the F-84F as soon as it comes from the factory. But it now develops that the British had exactly the same trouble with the blading in England and Armstrong-Siddeley made the same substitution of stainless steel for aluminum blading in the first three compressor stages months ago-they just neglected to tell Wright Aeronautical about it. Thus, these licensing agreements. which include "technical assistance" seemingly include only positive advancements and omit native troubles. precisely the sort of thing that is always badly needed in an exchange of technology.

Supersonic Fighter

After some five years of very extensive prediction, the U.S. now has in actual production the world's first supersonic fighter, the North American F-100. A development of the war-winning F-86 Sabre, the F-100 is a bigger airplane with a 45-deg swept wing and is powered by a Pratt & Whitney J57 turbojet engine with afterburner giving it astronomical thrust (rumored as high as 15,000 lb). The prototype F-100's at Edwards Air Force Base are flying regularly at supersonic speed in level flight at sea level and this means very high supersonic speed at high altitude. North American president J. L. Atwood describes the F-100 as "as big an advancement over the F-86 Sabre as the F-86 was over the wartime F-51 Mustang." While supersonic

(Turn to page 158, please)

NOW

more sizes of...

Stainless Socket Cap and Set Screws

Available in stock from your Allen o Distributor

Demand for rust and corrosion resistant socket screws of high finish 18-8 stainless steel has been increasing steadily for ten years.

Allens have become the leading make because of the inherent advantages of Allen manufacturing methods, and because Allen Distributors carry the widest range of sizes as standard stock items — saving their customers time and money.

Now Allen widens its margin of leadership with still more distributorstocked standard sizes in stainless:

97 Standard Sizes in Stainless Steel Socket Cap Screws

#4 x ¼" to %" x 3" with NC threads #10 x %" to %" x 1½" with NF threads

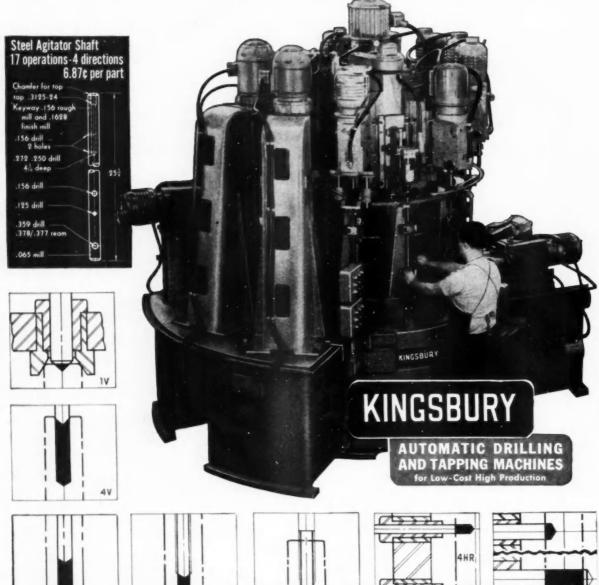
54 Standard Sizes in Stainless Steel Socket Set Screws

#4 x 16" to 1/2" x 1" with NC threads #10 in lengths from 1/6" to 3/4" with NF threads

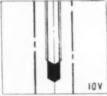


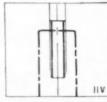
Sold only through leading industrial distributors

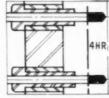
Combine Operations on a Kingsbury and turn



5 V 64 7 V 84









In one cycle through this Kingsbury, each of

This steel agitator shaft presented interesting problems: its shape, for one thing. It is 25% inches long and 7%-in. O.D. It has a keyway at each end, and an axial hole 456 inches deep. Two ports enter this hole at 90°, and three horizontal holes are drilled through the shaft at 90° to these ports. The Kingsbury has 11 units and an air-

operated stamp mounted on the central column. Six units are mounted on the base; 12 work-holding fixtures are mounted on the 60-in. index table. Each fixture presents its work to cutting tools at 11 stations. One operator loads and unloads.

Axial Hole: To speed production, this hole is completed in 9 steps. Customer allowed these steps to vary from a start of .272 dia. to .250 dia. — a great help!

Unit 1V: .343 at 45° spot for countersink.

Sliding drill bushing carrier is piloted to top of work for concentric start of hole.

Drilling Units: 4V thru 10V complete the hole to a depth of 45/16 inches.

Unit 11V .3125-24 taps hole 34-in. deep.

out many parts per hour at low cost per part

You can combine your drilling, c'boring, reaming, tapping, light milling, recessing, spotfacing or threading

operations — and reduce your costs.

Your part can be of any metal or material that can be machined economically. It must be of a size and weight which can be machined within the limits of 5 HP units and be handled efficiently by your operator. You must want a lot of parts per man-hour, because you'll get high production.

You'll get uniform accuracy. Your scrap loss will be reduced to a minimum. You'll save floor space. You'll eliminate re-handling. In fact, you'll be very

happy about the whole thing!

Now, a word about the costs quoted in this advertise-ment. These costs amortize the entire Kingsbury investment over 6000 hours. This is a fraction of its useful life! They include the cost of the man and machine, but no power or overhead.

They assume unit cost of the man to be:

average U.S. hourly wage

hourly gross X 80% efficiency

They assume unit cost of machine to be: price of tooled machine

output in 6000 hrs. at 80% efficiency

Each Kingsbury machine is custom-built to do a specific group of jobs — and is given a trial run for your approval of the machined part before delivery. Are you really interested? If so, we'd like to see you. Kingsbury Machine Tool Corp.

103 Laurel St., Keene, N. H.



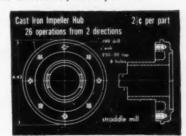
- Steel Transmission Sleeve 350 parts per hour gross—1-4/10¢ each

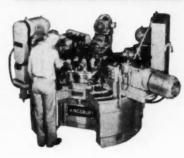
Note plan view drawing — it shows the angles. Note plan view drawing — it shows the angles. Four work fixtures are located on a 20-in. index turret. All work is performed at three stations. Two horizontal and two vertical drilling units are mounted on the 60-in. base. One vertical drilling unit has a milling attachment with side adjustment to compensate for cutter wear. Work fixtures are unclamped automatically at the unloading station.

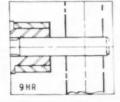
Cast Iron Impeller Hub -204 parts per hour-21/24 each

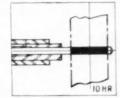
In this Kingsbury the units are located on the 80-inch base, and the work fixtures on a 26-in. turnet. There are 8 stations.

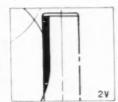
The machine performs 26 operations. Eight holes are drilled, c'sunk and tapped. But the milling operation is the most interesting. A milling unit is attached to a drilling unit equipped with a 7-in. stroke attachment. Cutters feed from right to left through the work, straddling the material.















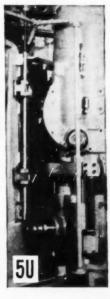
12 parts receives 17 operations from 4 directions

Horizontal Holes: Drills are located accurately by sliding tool guide bushing carriers piloted to each work fixture.

Unit 4H (right) has a 2-spindle auxiliary head - drills two .156 holes thru into axial hole on center line of keyway. Unit 8H (right) operates 2 spindles - drills .156 and .359 through shaft. Unit 9H (right) reams the .359 hole to .378/.377 diameter. Unit 10H (right) .125 drills through.

Keyways: At top of shaft, .156 wide keyway is rough- and finish-milled by units at 2V and 3V. At bottom of shaft keyway is milled .065 wide by Unit 5U (under), as shown in photograph at right. All milling units can be adjusted to maintain accuracy.

At Station 12 (where operator loads and unloads the machine) an air-operated identification stamp works on top end of the shaft just prior to the unclamping of the workholding fixture.



AIRBRIEFS

(Continued from page 154)

speed by special research airplanes (both here and abroad) in level flight, and by existing fighters in dives has become commonplace, the F-100 is the world's first truly supersonic combat airplane to go into production and the painful gap between the F-86 and airplanes the Russians might have at the front in a future outbreak of Korean-type battle is now definitely closed.

Effects of Changes in Air Force

Present combat plane production rates and the speed at which aerial strength is developing will not be affected by a \$750 million reduction in Air Force procurement plans.

Of the 965 aircraft which have been dropped from the Air Force buying program, 151 are B-47 jet hombers which were already on order. The others, including 18 other B-47s, 579 jet fighters, 207 trainers, and 10 helicopters, had been planned, but not ordered.

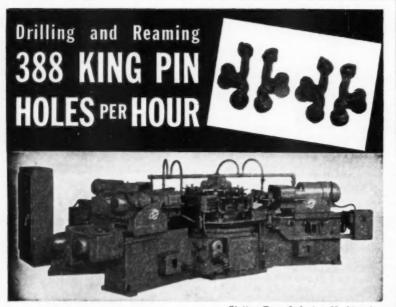
Defense Secretary Wilson says the move is not a cutback and not a portion of a Defense Dept. economy move. He calls it the result of an overall air force survey of current production and future requirements.

Money thus saved belongs to the Air Force, which will order more modern planes. Some of these will be an additional number of F-100 fighters. These are known to have attained supersonic speed.

Under Secretary of the Air Force James H. Douglas says he is considering opening a second plant for production of eight-engine B-52 bombers. Boeing has these in early production stages at its Seattle plant.

The change in B-47 orders will mean a long stretch-out in production at the Boeing plant in Wichita, Kan.; the Lockheed plant in Marietta, Ga.; and the Douglas plant at Tulsa, Okla. Most of the B-47s were to have been used by air training command to teach crews for Strategic Air Command, but the latter will now handle its own final crew training.

Douglas says that planes involved in the reduction would not be required even if the former Air Force goal of 143 wings were reinstated by the Joint Chiefs of Staff. The present Administration goal is 120 wings.



On a Davis & Thompson 5 Station Machine

This type MDT FIVE STATION IN-DEXING DRILLER has five fixtures mounted on the index table. Each of these fixtures holds 2 RH and 2 LH automobile front suspension support arms. Four ROTO-MATIC Power Heads, each having four spindles, perform the following operations:

- 1. Drill 53/64" dia.-Half way through.
- Drill .823" dia. Balance of way through.
- 3. End Cut Ream .8547/.8550" Full length of hole.
- Finish Ream.8635/.8637"—Full length of hole.

Station Type Indexing Machine for drilling and reaming king pin holes.

Two RH and two LH pieces are completed at the end of each cycle. Cycling is automatic, and, operator loads and unloads during machine cycle.

4 New Davis & Thompson Mechanical Power Heads

Included in the design of this machine are the new ROTO-MATIC Mechanical Electrical Power Heads operated through screw feed. An important safety feature of these units is the patented overload release clutches on the feed. Because of the simplicity of their design the units require a minimum of servicing.

Free Data

Will be furnished on request.



Davis & Thompson Company

BOOKS ...

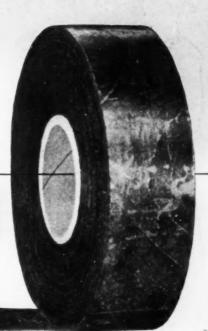
REVIEW OF CURRENT RESEARCH AND DIRECTORY OF MEMBER INSTITUTIONS, published by Engineering College Research Council of the American Society for Engineering Education. Copies available from V. E. Neilly, 103 Mechanical Engineering Bldg., State College, Pa. Price, \$2.50. This reference book describes in detail research projects currently underway at the 103 major U. S. engineering schools which are members of the Engineering Research Council. In addition to the approximately 5000 entries of research project subjects, other information contained in the book includes: names of responsible research administrative officers; policies which govern research projects and contracts; personnel engaged in research activities; annual expenditures for research contracts; cources of income for research; and special conferences and short courses of interest to research workers.

TEST SPECIFICATIONS, published by United Motors Service, 3044 W. Grand Blud., Detroit 2, Mich. Price, \$0.25. This booklet has been revised to include the most recent specifications for all active models of Delco-Remy distributors, generators, cranking motors, regulators and magnetic or solenoid switches. It is published for persons engaged in the maintenance and testing of automotive electrical equipment in the service field.

GOT AN INSULATING

PROBLEM?

TAPE IT WITH MICABOND



C-D-F, expert in insulation, uses superior grades of mica, places it for complete leak-proof coverage, and applies strong, pliable electrical insulating binders. All Micabond Tapes are hand laid. The large India mica splittings used retain their electrical insulating properties at elevated temperatures.

GRADE PAPER BOTH SIDES

All edges overlapped, faced on each side with strong, tough tissue paper. Flexible binder will not dry out under ordinary conditions. Thickness .005", .007".

COTTON CLOTH ONE SIDE, PAPER ONE SIDE

Bonded with flexible binder. Backed on one side with thin cotton insulation cloth, faced with tissue paper on other side. High tensile strength. Good tear resistance. Use where moderate high voltages are encountered, where space is not limited. Thickness .006", .008".

CELLOPHANE BOTH SIDES

Faced on both sides with .001" thick moisture-proof cellophane. Unusually high tensile and dielectric trengths. Not quite so pliable. Thickness .005", .007".

CRADE SILK ONE SIDE, PAPER ONE SIDE

Bonded with flexible insulating cement. Backed with .001" silk, and faced with tissue paper on other side. Silk gives tape good tensile and tear strength. Good dielectrically, this tape meets all normal requirements. Thickness .005", .007".

SILK BOTH SIDES

Bonded with flexible, non-slipping binder. Thin silk is used for facing on both sides. High tensile strength. Fine tear resistance. Excellent dielectric strength. The ideal tape for ease of application... use where space is limited. Thickness .005", .007".

Silicone Bond, Fiberglas cloth one or both sides for class H insulation. This inorganic tape withstands temperatures 50°C-75°C higher than organic bonded material. Thickness .004", .006".

Write now for Micabond Catalog. Call your C-D-F sales engineer (sales offices in principal cities). His special knowledge and experience will help save you time and money. He's a good man to know!

THE NAME TO REMEMBER



MICABONS

Continental-Diamond Fibre Company

NEWARK 2, DELAWARE

THE LEADERS LOOK TO THE LEADER



EASY WASHERS Use C/R Oil Seals

One secret of the outstanding success of the Easy Washing Machine is the special oil used in the gear-case assembly. This lubricant is of so high a quality that it normally lasts for the entire life of the machine.

There can be no doubt, likewise, about the lifetime performance of the oil seal that keeps this fine oil in, and dirt out.

The day-in and day-out utilization of a washing machine over long years of household service is a severe test of all working parts. Easy Spindriers are famous for long and trouble-free performance. A C/R oil seal, with Sirvene synthetic rubber sealing member, guards this smooth functioning at the very heart of the machine—the gear case.

Another example of a leader looking to the leader, for research, engineering and manufacture of the highest type. If you have a particularly tough oil-sealing problem, where failure simply cannot be allowed to occur, put it up to Chicago Rawhide engineers. This sort of thing has been their specialty for 30 years.

C/R oil scals, the most widely used, are stocked in over 1800 sizes covering 16 different types, for immediate delivery. Our booklet, "Engineering with C/R Oil Seals," belongs in your files. Allow us to send it to you, without cost or obligation.

CHICAGO RAWHIDE MANUFACTURING COMPANY

1310 Eiston Avenue OIL SEAL DIVISION Chicago 22, Illinois

 More automobiles, farm equipment and industrial machines rely on C/R oil seals than on any similar sealing device.





News of the MACHINERY INDUSTRIES

(Continued from page 63)

Segundo, Calif., has announced the formation of a new Electronic Division of the company. The new division will specialize in the development and production of d-c regulated and unregulated rectifier-type power supplies, magnetic amplifier controls, magnetic servo amplifiers, and transformers.

Elmes Engineering Div., American Steel Foundries, has appointed John E. Bush as district representative of the Chicago territory with headquarters at 410 N. Michigan Ave.

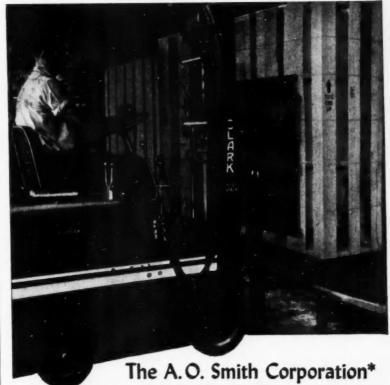
Hydropress, Inc., is supplying a complete aluminum foil rolling mill installation of the Hydromil design to the Takada Aluminum Co., Osaka, Japan.

The recently formed Wagner Brothers Equipment Co. has acquired a production plant in Wayne, Mich., where the firm's new fully automatic electroplating machine has been placed in production.

BOOKS ...

ASTM-IP PETROLEUM MEASURE-MENT TABLES, published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Prices: American Edition, \$8.75; British Edition, \$7.00; Metric Edition, \$7.70. This material, prepared jointly by the American Society for Testing Materials and the Institute of Petroleum, Great Britain, consists of a comprehensive group of tables, standardized on an international basis for the calculation of the quantities of crude petroleum and petroleum products in any of three widely-used systems of measurement. Three separate editions: "The American," "British," and "Metric" are now available.

SYMPOSIUM ON TESTING METAL POWDER PRODUCTS, published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, \$2.40. The symposium covered in this book features seven papers in which specific methods of testing metal powders and metal powder products are discussed. In the field of metal powder products, specifications are developed for those applications and types of products where powder metallurgy has been well-established as a production method. Several new applications and improved compositions for known applications are discussed in the first group of four papers. The most important of the metal powder testing methods is the determination of particle size distribution, particularly in the range of sub-sieve particle sizes. The last three of the papers in the symposium are concerned with this field in which standardization in just beginning.



SAVES \$108,000 a YEAR

in materials handling!

This is what the A. O. Smith Corporation accomplished:

- I Saved 43,300 manhours or \$78,000 a year in shipping and warehousing.
- 2 Minimized breakage and damage to crates, saved \$30,240 a year on repair labor.
- 3 Eliminated 4000 double-faced pallets costing \$16,000.
- 4 Accomplished a 30% reduction in required storage area—crates are exactly-positioned in neat rows, two, three and four high.
- 5 Cut boxcar loading time in half—one car is fully-loaded in one hour flat, by one man.
- 6 Eliminated hazardous difficult labor—all lifting is done mechanically.



WITH A SPECIAL "FINGER-LIFT" device for crate-handling, combined with a side-shifter attachment for their fork trucks, the A. O. Smith Corporation not only reduced labor costs \$108,000 a year—they also eliminated \$16,000 worth of pallets and made available 27 men and 3 trucks for other work!

As usual, CLARK plays a major role in this amazing savings achievement. Admittedly, not everyone can save \$100,000 a year with modern handling equipment; but by the same token, you might save more, depending on the nature of your handling problem. Why not find out what's in it for you? Simply ask your CLARK Dealer to analyze your own particular handling activities. Don't pass up this opportunity for really big savings!

 Permaglas-Heating Division, Kankakee, Illinois Detailed case history available on request.

CLARK FORK TRUCKS AND POWERED HAND TRUCKS INDUSTRIAL TOWING TRACTORS

Please sendi	Case History	Material Ha	ndling News	
Name				
Firm Name				
Address				
City		Zone	State	

More Defense Contract Awards

This latest list of defense prime contracts that have been awarded covers the period from July 22, 1953, to August 19, 1953. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages,

trucks, warplanes, automotive components and spare parts, automotive maintenance equipment, etc.

-A-

ACF-Brill Motors Co., Philadelphia, Pa. Generator sets—255 ea.—\$1,120,315 Aerolab Company, Detroit, Mich. Vehicle parts—3200—\$39,872

Vehicle parts—3200—\$39,872
Active Gear Co., Inc., Chicago, Ill.
Vehicle parts—2000—\$53,900
Vehicle parts—16,000—\$57,794

Ainsworth Manufacturing Corp., Detroit.
Mich.

Rack homb 3177 eg \$656 420

Rack-bomb—3177 ea.—\$656,420 Rack-bomb—1200 ea. Rack-bomb—951 ea.



Actuator assy—5 ea.
Actuator assy—159 ea.

Aircraft Engine Service, Inc., Miami, Fla.
Overhaul of aircraft engines—150 ea.
\$298,960

Actuator assy-86 ea.-\$191,589

Airborne Accessories Corp., Hillside,

Air Associates, Inc., Teterboro, N. J.

Actuato:s-1150 ea.-\$351,866 Actuators-116 ea.

Actuators-106 ea

N. J.

Aircraft Radio Corp., Boonton, N. J.

Mount, Vibrator.—251,202 ea.—\$255,081
Oscillator assy—2102 ea.

Shock absorber assy—12,984 ea.—
\$27,369
Snap slide—37,271 ea.
Screw-locking—6605 ea.

Aircraft Tool & Mfg. Co., Vassar, Mich. Small arms parts—1400—\$38,630

Airesearch Mfg. Co., Div. Garrett Corp., Los Angeles, Calit. Valve assy—34 ea.—\$32,331 Regulator assy—56 ea.—\$54,608

American Car & Foundry Co., New York., N. Y. Small arms parts—470—\$217,003

American Machine & Metals. Inc., U. S. Gauge Div., Sellersville, Pa. Transmitter, fuel pressure—629 ea— \$117,404

Transmitter, oil pressure—935 ea.
Transmitter, oil pressure—773 ea.
Transmitter, torque pressure—513 ea.
—\$44,028

Antigo Machine Co., Antigo, Wis. Vehicle parts—12,000—\$26,956

The Armstrong Rubber Co., West Haven, Conn. Tires—11,419—\$419,534

Tires—11,419—\$419,534
Tires—70,498—\$1,997,208
Tires—39,310—\$272,221
Tires—26,044—\$316,304

Aro Equipment Corp., Bryan, Ohio Regulator—2273 ea.—\$582,375 Regulator—4669 ea. Regulator—3691 ea.

Avco Manufacturing Corp., Lycoming Spencer Div., Williamsport. Pa. Generator set—233 ea.—\$1,794,644 Overhaul & test aircraft—150 ea.— \$332,833

Avien-Knickerbocker, Inc., Aviation Engineering Div., Woodside, N. Y.
Temperature indicator—1590 ea.—
\$212,265

— B —

Baldwin-Lima-Hamilton Corp., Philadelphia, Pa.

Diesel power facilities—26 ea.— \$2,956,424

Barber Colman Company, Rockford, Ill. Actuators, control—\$96,245

The Barr Rubber Prod. Co., Sandusky.
Ohio
Vehicle parts—125—\$68,187

Beech Aircraft Corp., Wichita. Kans. Spare parts—\$33,662

Bendix Aviation Corp., Bendix Pacific Div., Hollywood, Calif. Spare parts—\$57,037 (Turn to page 166, please)



Higher horsepower and higher compression put heavier loads on the tappets.

Johnson quality assures you the performance you want from these vital engine parts.





JOHNSON JP PRODUCTS

INC. MICHIGAN



Famous Farberware begins with the finest stainless. And for dependable deep-drawing of stainless blanks, S. W. Farber, Inc. relies on Bliss toggle drawing presses-and has since 1917.

Today, the two Farberware plants are 100% Bliss on drawing presses; 85% Bliss on all other types.

Proven performance is the reason for this choice, of course. But here are a few of the specific operating advantages cited by H. M. Harrison, Vice President of S. W. Farber, Inc.:

- 1. Precision action delivers uniformly high-quality parts; keeps rejects at a minimum.
- 2. Bliss toggle presses are easy to set up, easy to change over; give trouble-free operation.
- 3. Maintenance requirements are nominal - adjustments are made quickly and easily when needed. (Floor level greasing system is a typical convenience.)

Perhaps Bliss toggle presses can solve your special deep-draw problems, too. But whatever your problems, if you're looking for high-quality, highspeed production in your press department, call a Bliss engineer. He will be glad to help you choose the right press for the job - mechanical or hydraulic - because Bliss makes them all.

1750 POTS IN EIGHT HOURS-that's the average production rate on this 5-S Bliss toggle. The four-quart pot is drawn 41/2 inches deep in one operation from a 15-inch diameter blank of stainless.

SMOOTH BULGE on this pot cover makes it easy to clean-but calls for good press work. A rubber die is used with this 31/2-B toggle press to perform this operation.



BUSS on your press is more than a name...it's a guarantee

E. W. BLISS COMPANY, Canton, Ohio PRESSES, ROLLING MILLS, SPECIAL MACHINERY

E. W. Bliss (England) Ltd., Derby, England . E. W. Bliss Company (Paris), St. Oven sur Seine, France



WORLD'S FIRST COMMERCIAL FACILITY



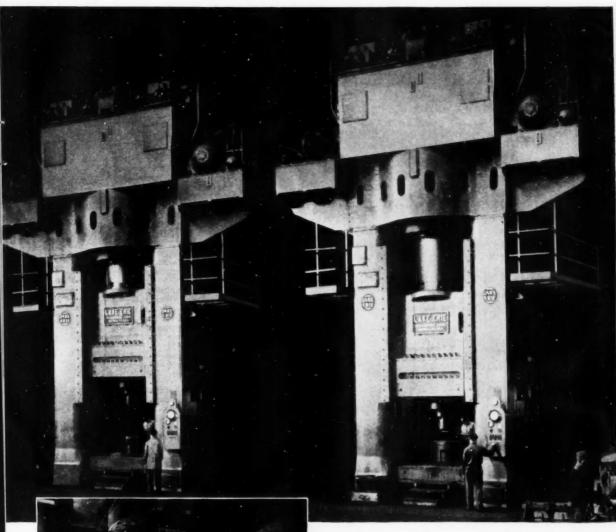
for producing parts by MULLINS STEEL Koldflo* Process

This new facility of the Mullins Manufacturing Corporation makes available to American Industry for the first time the economies and other advantages of Koldflo* production. It is a process in which parts are cold-formed into hollow shapes with a wide variety of configurations and in lengths from 6" to 36" with diameters from 2" to 6". The finished products come from the presses with smoothness, hardness, strength and precision. All of these desirable features are obtained by this process while using low carbon, low cost steel.

MAIN BATTERY OF PRESSES FURNISHED BY LAKE ERIE

These four 3,000-ton hydraulic presses weigh over 700,000 pounds each. They stand 33'-3" above the floor and extend 6'-7" below the floor. Beds measure 72" x 60", daylight openings are 96" and strokes 48". The high-speed, self-contained pumping units on each press are powered by 750 HP motors. This installation is another excellent example of Lake Erie's ability to construct hydraulic presses for any process or manufacturing requirement.

*Koldflo is a trade-mark of Mullins Manufacturing Corporation





FIRST PRESS PRODUCED IN THE UNITED STATES SPECIFICALLY FOR THE COLD EXTRUSION OF STEEL

Close-up view of the original 3,000-ton Lake Erie "laboratory" press purchased by Mullins in 1949 for Koldflo* development and production. Outstanding performance of this press led to the selection of Lake Erie equipment again for the main battery in Mullins' new commercial installation. There can be no better evidence than this of customer confidence and satisfaction.

LAKE ERIE HYDRAULIC PRESSES

LAKE ERIE ENGINEERING CORP.

General Offices and Plant

509 Woodward Avenue, Buffalo 17, New York

District Offices in New York • CHICAGO • DETROIT • PITTSBURGH

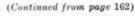
Representatives in Other U. S. Cities and Foreign Countries

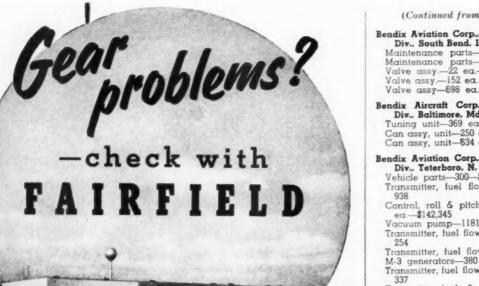
Manufactured in Canada by: CANADA IRON FOUNDRIES LIMITED

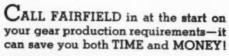
HYDRAULIC PRESSES . DIE CASTING MACHINES

ROLLING MILL AUXILIARY EQUIPMENT

LAKE ERIE







FAIRFIELD is one of America's largest independent producers of precision cut, automotive type gears such as are being used today in ever-increasing numbers in Agricultural Implements... Power Shovels ... Machine Tools ... Diesel Locomotives...Road Graders... Lift Trucks ... Road Rollers ... Pump Drives . . . Winches . . . as well as in Trucks, Tractors, and Military Vehicles.

Fairfield's facilities are unexcelled. Here "under one roof" in a new and ultra modern plant designed especially for the purpose, Fairfield has everything needed for producing fine gears EFFICIENTLY, ECONOMICALLY. Call or write for information TODAY.

Fine Gears made to order:

SPIRAL BEVEL . STRAIGHT BEVEL . HYPOID HERRINGBONE . HELICAL . DIFFERENTIALS SPUR . WORMS AND WORM GEARS

SINCE 1919

FIELD MANUFACTURING

2303 SOUTH CONCORD ROAD

LAFAYETTE, INDIANA

Bendix Aviation Corp., Bendix Products Div., South Bend. Ind.

Maintenance parts—Various—\$26,020 Maintenance parts—Various—\$97,824 Valve assy.—22 ea.—\$29,700 Valve assy.-152 ea.

Bendix Aircraft Corp., Bendix Radio Div., Baltimore, Md.

Tuning unit-369 ea.-\$68,623 Can assy, unit—250 ea. Can assy, unit—634 ea.

Bendix Aviation Corp., Eclipse Pioneer Div., Teterboro, N. J.

Vehicle parts-300-\$86,523 Transmitter, fuel flow-282 ea.-\$58, Control, roll & pitch vert. gyro-142 ea.-\$142,345 Vacuum pump-1181 ea.-\$477,483 Transmitter, fuel flow-349 ea.-\$700,-

Transmitter, fuel flow—1776 ea. M-3 generators—380 ea.—\$91,374 Transmitter, fuel flow-176 ea. \$144,-

Transmitter, fuel—9 ea.
Transmitter, fuel—52 ea.
Rotor-assy-hairspring—977 ea.—\$31,-Shaft-vane-2244 ea.

Indicator, multi-purpose—813 ea.— \$47,131 Indicator-4132 ea.-\$5,797,948 Indicator—6428 ea. Indicator-6058 ea.

Bendix Aviation Corp., Red Bank Div., Ectontown, N. J.

Inverters—796 ea.—\$793,913 Inverters—182 ea. Inverters PR 282632Q-972 ea. Inverter, single phase 275 ea. \$94,-

Boeing Airplane Co., Seattle, Wash. Services—\$1,468,009 Strut assemblies—48 ea.—\$337,410 Strut assemblies—23 ea.

Strut assemblies—23 ea. Bogue Electric Mig. Co., Paterson, N. J. Motor generator sets—112 ea.—\$398,-

720 Borg-Warner Corp., Long Mfg. Div., Detroit, Mich.

Auto, spare parts-30,500-\$155,293

Borg-Warner Corp., Pesco Products Div., Bedford, Ohio Maintenance parts—Various—\$60,520 Pump assy—Various—\$529,189

The Buda Company, Harvey, Ill. Generator set-20 ea.-\$161,013

Butler Manufacturing Company, Kansas City. Mo.

Fuel servicing semi-trailer-337 ea.-\$5,379,356

Continental Motors Corp., Muskegon, Mich.

Engine-255 ea.-\$505,193 Tank spare parts—57,975—\$51,275 Tank spare parts—5450—\$58,508 Engines—1037 ea.—\$2,095,264

Cooper Tire & Rubber Co., Findlay, Ohio Tires—59,300—\$1,720,727

Tires-14,490-\$286,098 Tires-47,600-\$346,980

(Turn to page 169, please)







equipment has a record for

DEPENDABILITY

Today K-S automotive gauges and speedometers are standard equipment on 17 makes of passenger cars, trucks and buses—about 30% of this country's production. And the majority of these vehicle manufacturers have used K-S equipment for 15 years or more—some for more than 20 years.

This widespread acceptance of K-S products is the result of progressive engineering and precision manufacturing—K-S know-how. The continued use of K-S products for such long periods definitely indicates performance that is consistently satisfactory.

When you standardize on K-S automobile gauges, speedometers and instrument clusters, you offer your customers this same dependable performance.



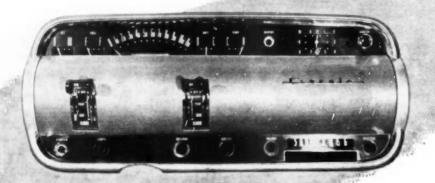
ANN ARBOR, MICHIGAN

Plants at ANN ARBOR, SCIO and YPSILANTI











(Continued from page 166)

Curtiss-Wright Corp., Electronics Div., Carlstadt, N. J.

Trainers, instrument flying-4 ea.-\$250,213

Curtiss-Wright Corp., Propeller Div., Caldwell, N. J. Design blades-16 ea. \$45,780

- D -

Dana Corp., Toledo, Ohio Vehicle parts-15,600-\$194,277

Dayton Rubber Co., Dayton, Ohio Tires—11,140—\$232,770 Tires—45,800—\$1,315,830

Decker Aviation Corp., Philadelphia, Pa. Gage-953 ea. \$66.262

Denman Rubber Mig. Co., Warren, Ohio Tires—22,800—\$696,540 Tires—5400—\$112,320 Tires—7200—\$105,840

Detroit Michigan Stove Co., A. B. Stove Div., Battle Creek, Mich. Vehicle parts-20,000-\$818,800

Dismuke Tire & Rubber Co., Clarksdale, Miss Tires-677,200-\$146,644

Douglas Aircraft Co., Inc., El Segundo, Calif.

Maintenance-Various-\$182,364 Du Page Gear & Machine, Elmhurst, Ill. Vehicle parts-4000-\$47,088

-E-

Thomas A. Edison, Inc., West Orange, N. J.

Panel assy.—326 ea.—\$51,847 Panel assy—21 ea. Relay—186 ea. Relay panel, 4 circuit-53 ea.-\$70,119 detector, thermacouple-36,500 Fire ea.

Eicor, Inc., Chicago, Ill. Dynamotor-125 ea.-\$1,000,584 ynamotor-56 ea. Dynamotor-3878 ea Inverter-812 eq.-\$573,419 Inverter-82 ea. Inverter-588 ea. Inverter, rotary—239 ea.—\$85,451 Inverter, rotary—96 ea.

Electrical Engineering & Manufacturing Corp., Los Angeles, Calif. Motor-clutch-154 ea.-\$33,531

Rotor-39 ea. Strater assy-112 ea

Electrol. Inc., Kingston, N. Y. Valve assy-424 ea. \$49,358 Valve assy-82 ea.

-F-

Facs Products, Inc., Chicago, Ill. Vehicle parts-10,000-\$823,541

Fairchild Engine & Airplane Corp., Fairchild Engine Div., Farmingdale, L. L. N. Y. D-2 power plant—26 ea.—\$299,546 D-2 power plant—26 ea.

Federal Aircraft Works, Minneapolis, Minn.

Ski assy—6 set—\$45,060 Ski assy—6 set

Federal Fawick Corp., Federal Motor Truck Div., Detroit, Mich. Coleman towing tractor—28 \$554,059

Fenwal, Inc., Ashland, Mass. Switches—\$156,723

Ford Instrument Co., Div. Sperry Corp., L. I. City, N. Y. Indicator—399 ea.—\$7,163,932

Ford Motor Co., Aircraft Engine Div., Dearborn, Mich. Spare parts, engines—bulk—\$5,237,-

Facilities for research development, and production of certain automatic weapons—\$71,440

-G-

General Electric Co., Johnson City,

Spare parts-\$677,529

General Electric Company, Schenectady, N. Y.

Spare parts—\$313,766 Controller—8 ea.—\$320,959 Switch assembly—422 ea. Ignition unit—624 ea. Spare parts—\$80,675 Voltage regulator—213 ea.—\$75,695 Exciter—10 ea. Key-shaft—1478 ea.—\$25,513 Rotor-1730 ea. Plate & stud-834 ea Indicator, electric tachometer—1268 ea.—\$126,269

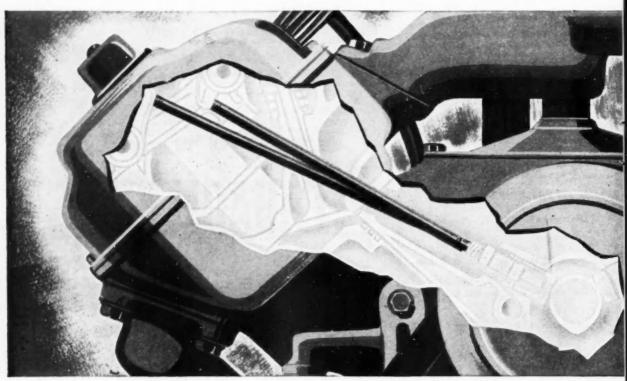
GMC. Chevrolet Motor Div., Detroit, Mich. Vehicle parts-\$56,112 (Turn to page 172, please)



WIREBOUND BOXES and CRATES WOODEN BOXES and CRATES CORRUGATED FIBRE BOXES BEVERAGE CASES STARCH TRAYS . . . PALLETS



RATHBORNE, HAIR and RIDGWAY BOX CO. 1440 WEST 21st PLACE . CHICAGO 8. ILLINOIS



Today's sharp swing toward higher horsepower overhead engines for passenger cars has resulted in many new solutions to old automotive problems. One result: Push rods of Bundyweld Tubing, long proved in truck engines.

Push rods of Bundyweld Tubing called for by newest trend in engine design

WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of copper-coated steel



twice around laterally into a tube of uniformthickness, and



passed through a fur nace. Copper coal ing fuses with stee

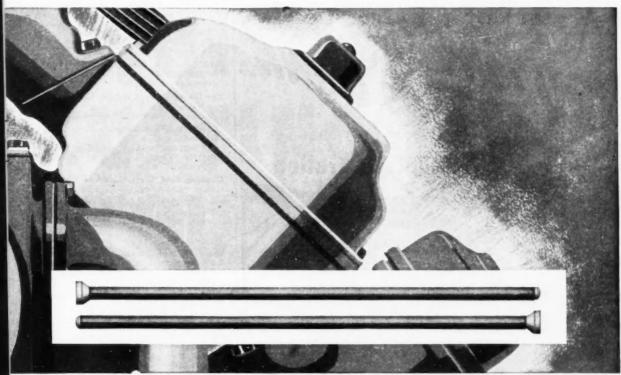


Bundyweld, doublewalled and brazed through 360° of wal



NOTE the exclusive patented Bundyweld beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

Bundy Tubing Distributors and Representatives: Combridge 42, Mass.: Austin-Hostings Co., Inc., 226 Binney St. e Chattanooga 2, Tenn.: Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. e Chicage 32, Ill.: Lapham-Hickey Co., 3333 47th Place e Elizabeth, New Jersey: A, B, Murray Co., Inc., Post Office Box 476 e Philadelphic 3, Penn.: Rutan & Co., 1717 Sansom St. e Seatte 4, Wesk: Ecogle Metals Co., 4755 First Ver., South Tereste 5, Ostario, Casadar Alloy Metal Sales, Ltd., 181 Fleet St., East e Bundyweld inickel and Monei tubing is sold by distributors of nickel and nickel alloys in principal cities.



Tough, lightweight push rods of hardened Bundyweld reduce cam load, increase efficient function of entire valve train. Bundyweld fabricates more easily than the material it replaces, results in more uniform, better finished parts.

Push rods of Bundyweld, long used in powerful truck engines, help improve performance of powerful overhead-type passenger-car engines.

The improved push rods in the overhead engines of some of today's most popular cars are made of lightweight Bundyweld Tubing.

Lightweight push rods of Bundyweld reduce load on cam, and, of course, the entire valve train follows the cam more closely. The design engineer is thus able to produce a more efficient, more powerful overhead engine in keeping with today's constantly growing trend.

The tubing: Bundyweld is the only tubing double-walled from a single

metal strip, with patented beveled edges. It's SAE 1010 steel, copper-bonded throughout 360° of wall contact into a strong, lightweight beadless tubing. Wall thickness and concentricity are uniform, accurate. Ultimate tensile strength, yield strength, and fatigue limit are exceptionally high.

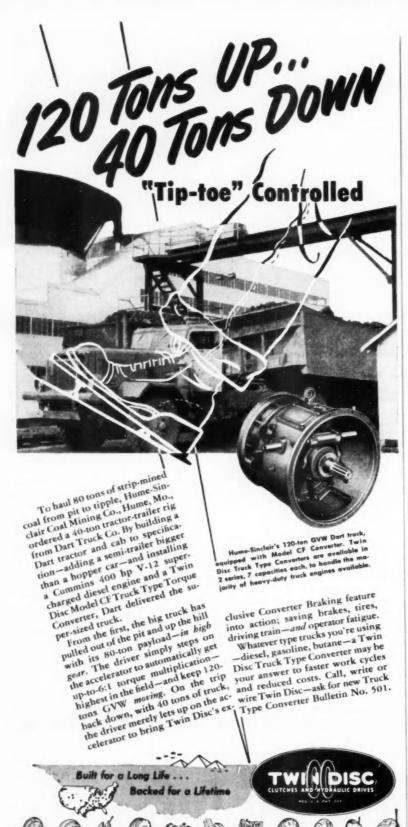
Engineering help: If you'd like help in determining how to apply Bundyweld toward solving your push rod problems, why not talk things over with one of our experienced automotive tubing engineers? You'll find them a prime source of sound information and ideas—not only on push rods but on other tubing applications.

Production: We're already massproducing Bundyweld for automotive push rods. And, naturally, we're ready to give you the same highvolume, low-cost service we're giving others. We'll ship Bundyweld —cold drawn to proper hardness, held to specified low camber tolerances—right on schedule.

Let us show you what we've done—and what we can do for you—with push rods of Bundyweld Tubing. Perhaps you'd like to check into Bundyweld for your gasoline, oil, hydraulic window or brake lines, too. For details, write Bundy Tubing Company—world's largest producer of small-diameter tubing.

BUNDY TUBING COMPANY . DETROIT 14, MICHIGAN

Bundyweld Tubing



TWIN DISC CLUTCH COMPANY, Racine, Wisconsin . HYDRAULIC DIVISION, Rockford, Illino

BRANCHES, CLEVELAND . BALLAS . DETROIT . LOS ARGILES . BEWARE . BEW ORLEANS . SEATTLE . TULSA

(Continued from page 169) nicles—195—\$257,762

Vehicles—195—\$257,762 Vehicles—106—\$251,316 Vehicles—186—\$217,369

GMC, Truck & Coach Div., East Pontiac, Mich.
Vehicles—4—\$342,346

The General Tire & Rubber Co., Akron. Ohio

Wheel assy nose—430 ea.—\$82,915 Gill Electric Manufacturing Corp., Red-

land. Calif.
Aircraft batteries—14 ea.—\$149,295
Aircraft batteries—31 ea.
Aircraft batteries—5 ea.

Gladden Prod. Corp., Glendale, Calif. Fuel valve—Various—\$136,344

The B. F. Goodrich Co., Akron, Ohio T-33 fuel cell assy—144 ea.—\$60,480 Brake assy—356—\$779,167 Wheel assy—272 Wheel assy—272

The B. F. Goodrich Co., Dayton, Ohio Wheel assemblies—321 ea.—\$770,610 Brake assemblies—287 ea. Wheel assemblies—175 ea.

Goodyear Aircraft Corp., Akron, Ohio Bearing—10,000 ea.—\$117,832 Spring—8000 ea. Spare parts—\$40,756

The Goodyear Tire & Rubber Co., Inc., Akron, Ohio

Brake assy—129 ea.—\$314,416 Brake assy—120 ea. Brake assy—200 ea. Wheel assy—1240 ea.—\$7,852,503 Wheel assy—1220 ea. Wheel assy—122 ea. Brake assy, main—51 ea.—\$120,195 Brake assy, main—48 ea. Brake assy—347 ea. Wheel assy—434 ea.—\$1,026,422 Brake assy—434 ea. Brake assy—434 ea.

Guardian Electric Mfg. Co., Chicago, Ill.
Control stick switch — 5059 ea. —
\$281,229
Gum-bomb-trim tab radar—4184 ea.

-H-

The Heil Company, Milwaukee, Wis.
Fuel servicing semi-trailer—400 ea.—
\$5.834.932

Hercules Motors Corporation, Canton, Ohio

Spare parts-Various-\$29,842

Holland Hitch Company, Holland, Mich. Vehicle parts—7000—\$96,810

Houdaille-Hershey Corp., Buffalo, N. Y. Shimmy damper—54 ea.—\$97,608 Shimmy damper—77 ea. Shimmy damper—25 ea.

Hustend Light Metals Company. Oakmont. Pa. Vehicle parts—4100—\$29,315

-1-

Ingersoll-Rand Company, Cincinnati, Ohio

Reciprocating compressor & related test equipment—\$86,100

International Harvester Co., Washington, D. C.
Vehicles—22—\$184,569
Vehicles—135—\$541,033

(Turn to page 174, please)

THIS IS THE CUTTING FLUID YOU TOLD US YOU NEEDED

YOU WANTED STRENGTH OF FILM

which would give you longer tool life

YOU WANTED LUBRICITY

to withstand pressure and reduce friction

YOU WANTED VERSATILITY

one cutting fluid to do 90% of all jobs

YOU WANTED GERMICIDAL PROPERTIES

no rancidity, freedom from skin sores

YOU WANTED COOLER WORK

which could be handled bare-handed

YOU WANTED LOWER COSTS

how's 8¢ a gallon, in the machine?

THE ANSWER IS:

ANTISEP "saves the day" for Cleveland valve manufacturer—cuts cost 50%l

After several prominent cutting fluids had failed to meet requirements, this concern decided to try Antisep, diluted 25 to 1, in the machining of valve stems from 416 stainless steel. Warner & Swasey 5-spindle automatic screw machines were used. Result: lower costs, improved tool life, greater uniformity in pieces machined. Parts come off oool, permitting higher speeds and heavier cuts.



ANTISEP

ALL-PURPOSE BASE

—not a more wider soluble oil, but a fortified concentrate potentifically developed to give you "100 oils in one!"

E HOUGHTON & CO.

Ready to give you on-the-job service . . .

(Continued from page 172)

Interstate Engineering. El Segundo. Calif.

Strut as NLG shock absorber-18 ea.-\$35,090 Plunger assy NLG-60 ea

-1-

Jack & Heintz, Inc., Cleveland. Ohio 400 amp generators—52 ea —\$28,048 250 VA inverter—1600 ea —\$1,063,386 250 VA inverter-161 ea. 250 VA inverter-1033 ea Inverter-VA-200 ea.-\$478,923 Inverter-VA-19 ea.

Governor-20,000 ea. \$273,210

Kearfott Company, Inc., Little Fa'ls, N. J. Indicator-2009 ea.-\$255,826

The Kelly Springfield Tire Co., Cumberland, Md. Tires-2845-\$42,362

Kindred Aviation Company, Burbank. Calif.

Coil-786 ea-\$108,980 Dynamotor-40 ea.

Kollsman Instrument Corp., Elmhurst,

Indicators, airspeed-67 ea.-\$261,816 Transmitters, altitude—61 ea. Computer & transmitter—122 ea. Indicators-102 ea.-\$30,088

Motor-telegon-380 ea.-\$26,327 Tank assy-case—115 ea. Motor-telegon—66 ea. Indicator, true air-speed-215 ea-\$73,325

LaCrosse Trailer Corp., LaCrosse, Wis. Vehicles-11-\$37,842

Lear, Inc., Grand Rapids, Mich. Components, automatic pilot system-\$1,942,682

Actuator-138 ea.-\$44,604 Screwjacks-159 ea. Screwjacks-T drive-417 ea.

Lear, Inc., Romec Div., Elyria, Ohio Pressure pump—650 ea.—\$604,462 Pump—1125 ea. Control panel—675 ea.

Lee Tire & Rubber Co. of New York, Inc., Conshohocken, Pa. Tires—49,800—\$1,522,022 Tires—766—\$32,470 Tires-12,000-\$176,520

The Leece-Neville Company, Cleveland, Ohio

Motor assy-1370 ea.-\$225,693 Motor assy-1004 ea. Motor assy-240 ea Motor-1600 ea.-\$124,000

Leland Electric Co., Div. American Machine & Foundry Co., Dayton, Ohio VA motor generator—826 ea.—\$1,535,-

VA motor generator—77 ea. VA motor generator—305 ea. 1500 VA single phase inverter—37 ea. 1500 VA single phase inverter-189 eq.

Libbey-Owens-Ford Glass Co., Toledo, Ohio

Plateglass windshield—433 ea.—\$38,-

Link Aviation, Inc., Binghamton, N. Y. Jet instrument trainer—l ea.—\$585,292 Jet instrument trainer—17 ea. Instrument trainer—342 ea Spare parts—\$556,064 Spare parts—lot—\$3,996,313

Lockheed Aircraft Corp., Burbank, Calif. Modification-\$150,000

- Mc -

McCauley Industrial Corporation, Dayton, Ohio Propeller-500 ea -\$83.000

- M -

Machine Tool & Die Co., Detroit, Mich. Vehicle parts-3500-\$46,550

The Magnavox Company, Fort Wayne. Ind.

Motor-680 ea.-\$65,244 Rotor-2796 ea. Shield--5439 ea Control assy bomb arming—12,936 ea.—\$40,748

Mansfield Tire & Rubber Co., Mansfield.

Ohio Tires—7800—\$297,492 Tires—65,607—\$1,948,565

Maremont Automotive Products. Chicago, Ill.

Vehicle parts-1200-\$33,300

(Turn to page 176, please)

Test Cabinet

for SALT FOG CORROSION TESTS or HUMIDITY CORROSION TESTS

for Salt Fog Tests Meets the latest specifications of government and military authorities.

for Humidity Tests 95% to 100% relative humidity at room temperature to 125° F., temperature thermostatically controlled

features

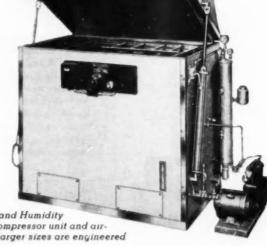
Lucite nozzle

Built-in heaters

Fully insulated

Exhaust flange at rear

Air-operated cover lifter (extra)



Standard size No. 1 INDUSTRIAL Salt Fog and Humidity Test Cabinet with air-compressor unit and airoperated cover lifter. Larger sizes are engineered to your requirements.

Write for complete information and recommendations

Pressure Type Centrifugal

CORROSION TESTING APPARATUS

INDUSTRIAL FILTER & PUMP MFG. CO.

FILTERS

5928 Ogden Avenue

RUBBER DIVISION Vulcanized Linings - Molded Products

PUMPS

here's a test you can make

with a quarter

Stand a quarter on edge directly over the spot where the BROACHING is taking places

remove all the required metal on a TURBINE DISC; go through the automatic cycling — repeatedly;

your quarter will still be standing!

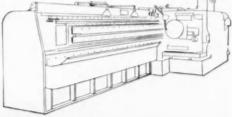
on this new

LAPOINTE

ELECTRO-MECHANICAL DRIVE horizontal

BROACHING

We eliminated vibration by the very weight and massiveness of this machine! Constant chatter or vibration at the cutting edge of any tool will materially shorten the life of the tool. Eliminate vibration and you multiply the life . . . six times . . . eight . . . or even ten times!



Strokes of 100" to 180", and broaching speeds up to 300 fpm — and more — are available on this amazing new LAPOINTE inachine. Complete details are given in our Technical Bulletin, sent promptly on request.

Ask for Bulletin S-R-H-E - 10

LAPOINTE

0

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES



Bowser units for the cold treatment of metals, with ranges from -50°F to -200°F (and lower), have countless applications in the making of better metal products.

For example, Bowser cold treatment, in standard, economical units built for operation at -150° F, can:

- Stabilize dimensions of precision parts, gages, etc.
- Increase hardness and wear resistance of carburized alloy steels: gears, shafts, pinions, etc.
- · Prevent warpage and eliminate cracks resulting from grinding and machining.
- Increase cutting tool life.
- Improve magnetic properties.
- Speed seasoning of castings.
- Salvage expensive out-of-size dies.
- Make possible faster, higher quality expansion fitting.

Request free descriptive bulletins describing new line of units.

TRY BEFORE YOU BUY

Why not investigate the possibilities of Bowser cold treatment in solving your metal working problems? Bowser metallurgists will be glad to cold treat your sample parts, tools or products -without cost or obligation.

Write For Details



BOWSER TECHNICAL REFRIGERATION

DIVISION BOWSER, INC. TERRYVILLE CONNECTICUE

(Continued from page 174)

Master Corporation, Wichita, Kans.

675 gallon bomb bay tank assy. 2 ea.-\$304,020

675 gallon bomb bay tank assy.— 223 ea.

Mechanical Products, Inc., Jackson,

Circuit breaker-25,490 ea.-\$349,960 Circuit breaker—38,916 ea. Circuit breaker—324 ea.

Mercury Electronic Co., Red Bank, N. J. Converter, static—1332 ea.—\$205,425 Converter, static—136 ea. Converter, static-485 ea

Miller Trailers, Inc., Bradenton, Fla. Vehicles-50-\$192,178

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Adapter, attitude trim-382 ea. \$243,-007 Adapter, attitude trim—27 ea. Adapter, attitude trim—43 ea. Components-\$7,901,169 Rack, power, unit and tank unit— Various—\$95,934 Components of E-6 autopilot-\$1,203,-

Mohawk Rubber Co., Akron, Ohio

Tires—46,805—\$1,454,625 Tires—16,500—\$245,190

-N-

J. M. Nelson Mig. Co., Ottawa, Ohio Vehicles—33—\$97,593

W. H. Nichols Company, Waltham,

Gasket incap-8200 ea.-\$30,650 Seal cap gasket—810 ea. Seal cap gasket—9850 ea.

North American Aviation, Inc., Los Angeles, Calif.

1200 gallon bomb bay tank assy-50 ea.—\$858,647 1125 gallon bomb bay tank assy— 50 ea.

Northrop Aircraft, Inc., Hawthorne, Calif. Mobile training unit-Job-\$150,000

Pacific Tire & Rubber Co., Oakland,

Calif.
Tires—14,800—\$447,108
Tires—28,500—\$408,975

The Parker Appliance Co., Cleveland.

Valve assys—215 ea.—\$35,601 Valve assy—Various—\$758,921

Pastushin Aviation Corp., Los Angeles,

Tank assy-5500 ea.-\$5,269,990 Pylon, alum alloy-5500 ea

Perfection Gear Co., Harvey, Ill. Vehicle parts-1000-\$25,500

Peters-Dalton, Inc., Detroit, Mich. Vehicle parts—1300—\$48,360

Piasecki Helicopter Corp., Morton. Pa. Helicopters. -105 ea. \$3,000,000

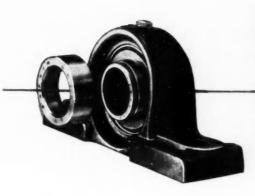
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa. Air heater-1 ea.-\$53,408

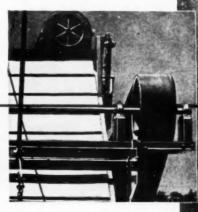
— R —

Reo Motors, Inc., Lansing, Mich.

Vehicle parts—2000—\$40,080 Bills of materials—28—\$27,227 Vehicles-3-\$27,672

The Engagement Ring makes it positive





When important shafts on farm machinery and Fafnir Wide Inner Ring Ball Bearings become engaged . . . there's never any question about shaft slippage. The engagement ring, known as the Fafnir originated Self-Locking Collar, makes the union positive beyond a doubt.

In the design of the Self-Locking Collar, you'll find the reason for this positive action. The collar is machined as a mating eccentric cam to the wide inner ring of the bearing . . . and it is counterbored too. A quarter turn of the collar on the inner ring assures positive locking action between bearing and shaft. No set screw, lock nuts or adapters are needed. No adjustments of any kind are necessary and the bearing cannot be cramped or overloaded in mounting.

For straight shaft mounting, the Fafnir Wide Inner Ring Ball Bearing with Self-Locking Collar continues to rate "tops" as a feature of power transmission units. Its positive-engagement, plus simplicity-of-mounting, plus efficient seals are features that lead to savings in design, assembly and maintenance. Are you taking advantage of them? The Fafnir Bearing Company, New Britain, Conn.

(Continued from page 176)

Republic Aviation Corp., Farmingdale.

Spare parts-\$277,915

Royal Electric, Inc., Jamestown, Ohio Motor-generator—1208 ea.—\$1,408,901 Motor-generator—416 ea. Motor-generator-202 ea.

Ryan Industries, Inc., Detroit, Mich. Rate of climb indicators—949 ea.— \$84,957

-5-

Salyers Equipment Co., Los Angeles, Calif

Generator sets-6 ea.-\$52,416

The Frank G Schenuit Rubber Co., Bal-

Tires-12,000-\$156,840

Seiberling Rubber Co., Akron, Ohio Tires—7000—\$147,805 Tires—6000—\$89,200

Sensenich Corporation, Lancaster, Pa. Propeller assembly—200 ea.—\$40,889

Propeller assembly-310 ea. Propeller assembly-155 ea

Servomechanisms, Inc., Westbury, L. I.,

Adapter-49 ea.-\$136,261 Amplifier-646 ea.

Simplex Manufacturing Corp., New Orleans, La.

Vehicles-439-\$104.789

Solar Aircraft Company, San Diego, Calif.

Manifold exh system-645 ea. \$82,117

Sparks-Withington Co., Sparton Automotive, Jackson, Mich.

Charger-5715 ea.-\$839,749 Charger-2146 ea.

Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L. I., N. Y. Directional gyro indicator—81 ea.

\$565,062 Components-208 ea. \$2,658,116 Components—832 ea. Components-208 ea. Auto pilot-\$100,000

Sperti-Faraday, Inc., Adrian, Mich. A-3 control—1621 ea.—\$117,671 A-3 control—769 ea.

A-3 control-350 ea.

Standard Steel Works, North Kansas City. Mo. Semi trailer-300 ea.-\$4,200,080

Standard Transmission Equipment Co.,

Pasadena, Calif. Small arms parts 53-1885-2466-\$56,-

Stewart and Stevenson Services. Inc., Dallas, Texas Generator sets-30 ea. \$194,264

Sun Electric Corp., Chicago, Ill. Hardware-10,000-\$189,000

Superior Coach Corp., Lima, Ohio Kit, hard top for truck cargo-11,727 ea.-\$955,633

The O. A. Sutton Corp., Wichita, Kans.
Tank assy—L.H.—5600 ea.—\$3,201,270
Tank assy—R.H.—5600 ea.

-T-

Thompson Products, Inc., Cleveland,

Motor-400 ea.-\$164,436 Motor-680 ea. Motor-95 ea.

Trailmobile, Inc., Cincinnati, Ohio Semitrailer, van-9 ea.-\$155,606

Tri Electronics Company, North Hollywood, Calif.

Mechanism for B-29 wheels-44 ea.-\$127,600

Tucker Sno-Cat Corp., Medford, Ore. tucker sno-cat-2 ea-\$62.846 Vehicle, tucker sno-3 ea Vehicle, tucker sno-l ea

Twin Coach Co., Kent, Ohio Vehicles-36-\$525.549

— U —

United Aircraft Corp., Hamilton Stand-ard Div., Windsor Locks, Conn.

Post test used on HSD propellers 134 ea. \$54,806 Post test used on HSD propellers-154 ea. \$56,272 Spare parts-180 ea -\$102,060

United Aircraft Corp., Pratt & Whitney Aircraft Div., East Hartford, Conn. Material for P&W engines-Various-

Spare parts-Various-\$159,907 Spare parts—Various—\$608,943 Spare parts—Various—\$284,470 Material—Various—\$349,997 Spare parts—5074 ea.—\$60,634 Spare parts—Various—\$109,380 Spare parts—Various—\$345,021

\$84,234

(Turn to page 180, please)

Netter description of the second **Eclipse-Pioneer*** triples balancing output of air-pump rotors with TREBEL BALANCER

Rough balancing increased from 3.1 to 9.6 per hour Fine balancing increased from 3.15 to 13.1 per hour

*Division of Bendix Aviation Corporation

Locate unbalance in your rotating parts this fast, simple way

Takes less than a minute to read, 2 minutes to set up.

No special skills are needed to detect the unbalance that causes vibration in rotating parts . . . when you use the TREBEL DYNAMIC BALANCER.

The unique TREBEL dynamic balancing principle applies a variable counter-vibration to counteract unbalance vibra-tion. Direct readings in ounceinches give the amount of unbalance without further calibration; readings in degrees show location of unbalance. That's why so many leading plants use the TREBEL.

Write for Catalog "B" or see a demonstration in your own plant.





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SKINNER ELECTRIC VALVE DIV. you will find the modern approach to 116 Edgewood Ave. your SOLENOID VALVE problems ... New Britain, Connecticut Please Help Us... SKINNER VALVES We would like complete data on the Skinner Valves checked below: □ V5-2 □ V2 GUARANTEE 19A □ V50 UV5-3 ☐ Send full information on valves for MILLIONS of CYCLES The measure of performance in an electric valve is in cycles-millions of them in Skinner Valves ... with the kind of guaranteed performance made possible through the constant research, lab testing and design facilities, ☐ Have salesman call (approx.) know-how of Skinner engineers and the productive capacity of an ultra-modern plant. Skinner Solenoid date Valves have a record of satisfactory and dependable performance in countless installations for gaseous or liquid control. Many models are Underwriters' Approved. Let us approach your problem in the modern manner. Some of the many Skinner Valves are shown below. V61 X5 3-way 0-150 p.s.i. 0-300 p.s.i V5 valves (except explosion proof) 0-300 p.s.i. V10 V50 V5-3



SKINNER ELECTRIC VALVE DIV., The Skinner Chuck Company, 116 Edgewood Ave., New Britain, Connecticut



ANOTHER EXAMPLE OF alenman PIONEERING ...

The WATERMAN TWIN POCKETSCOPE, model S-15-A, presents a new concept in multiple trace oscillescopy with independent vertical channets each having a sensitivity of 10 millivolts rms/inch, and a response within -2 db from DC to 200 KC-a pulse rise time of 3 microseconds. These features combined with the provisions for intensity modulating either, or both, traces, results in greater flexibility. The sweep generator is operated either in the repetitive or triggered mode from 0.5 cycles to 50 KC with synchronization polarity optional. All attenuators and gain controls are of the non-frequency discriminating type. Remember that portability has not been overlooked! The amazing small size of the S-15-A tips the scales of opinion heavily in its favor. Imagine, all of these essential characteristics in an instrument weighing only 1614 lbs. You can carry it to any job, anywhere!

WATERMAN PRODUCTS CO., INC. WATERMAN PRODUCTS INCLUDE PHILADELPHIA 25, PA. CABLE ADDRESS: POKLTSCOPE PULSESCOPES S-4-A SAR PULSESCOPE Write S-11-A INDUSTRIAL POCKETSCOPE BAKSCOPES 5-12-B JANized S-14-A HIGH GAIN POCKETSCOPE S-14-B WIDE BAND POCKETSCOPE Also RAYONIC® Cathode Ray Tubes and Other Associated Equipment WATERMAN PRODUCT

(Continued from page 178)

Items used on P&W engines—Various —\$1,200,104 Spare parts-Various-\$1,576,125 Material—Various—\$1,376,1298 Material—3085 ea.—\$96,812 Spare parts—Various—\$2,383,589 Material—Various—\$175,477 Spare parts—Various—\$412,160 Spare parts—Various—\$510,656 Spare parts—Various—\$428,698

United Aircraft Corp., Sikorsky Aircraft Div., Bridgeport, Conn. Maintenance trainer-1 ea-\$88,862

United Aircraft Products, Inc., Dayton, Ohio

U 765 fuel cock—25 ea.—\$44,266 U 770 fuel cock—161 ea. U 845 fuel cock-362 ea. Valve assy—322 ea.—\$52,483 Cock assy—100 ea. Cooler assy-30 ea. Valve assy-508 ea.-\$31,194 Valve assy-336 ea. Valve assy-435 ea. Valve assy-400 ea.-\$29.603 Valve assy-288 ea. Valve assy-126 ea. Bellows assy-fuel pump-2059 ea. \$514 873 Pump assy-hand-761 ea Cooler assy-oil-674 ea.

United Motor Services, GMC. Detroit. Mich.

Vehicle parts-6500-\$146,575

U. S. Electrical Motors, Inc., Los Angeles, Calif. Motors-460 ea. \$257,668

United States Rubber Co., Fuel Cell Div., Mishawaka, Ind.

Misc. B045 fuel cells—13 ea.—\$29,679 Misc. B-45 fuel cells—8 ea. Misc. B-45 fuel cells—7 ea. Fuel cells—101 ea.—\$191,204 Fuel cells—336 ea. Fuel cells-721 eq.

– V –

Varo Manufacturing Co., Inc., Garland, Texas

Gun bomb rocket sight-270 ea.-\$483 214 Gun bomb rocket sight—230 ea. Gun bomb rocket sight—324 ea. Converter PR 189772Q—367 ea.—\$31,-

Vickers, Inc., Detroit, Mich.

Spare parts—16 ea.—\$78,526 Spare parts—1185 ea. Spare parts-319 ea.

Victor Mig. & Gasket Co., Chicago, Ill. Vehicle parts—44,000—\$53,679

Vogt Brothers Manufacturing Co., Louisville, Ky. Rack-bomb—5263 eq.—\$724.894

Rack-bomb-2500 ea. Rack-bomb-1952 ea.

$-w_-$

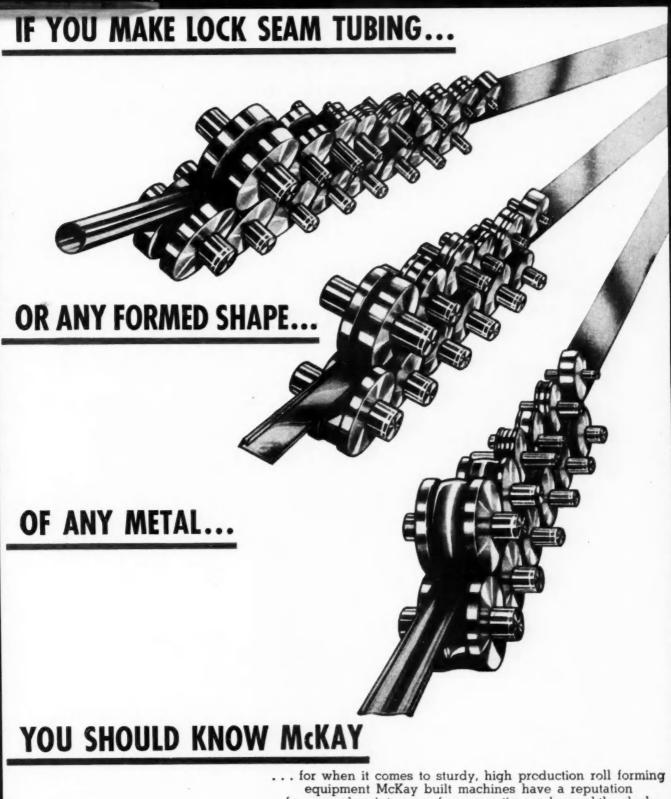
Wayne Aluminum Foundry & Machine Co., Garden City, Mich. Vehicle parts—500—\$42,500

Westinghouse Electric Corp., Dayton, Ohio

Generator-222 ea.-\$469,711 Generator—380 ea. Spare parts & data-244 ea

Westinghouse Electric Corp., Aviation Gas Turbine Div., Philadelphia, Pa. Spare parts—Various—\$47,418

(Turn to page 182, please)



for rugged maintenance-free operation and round-the-clock performance unsurpassed in the industry. Be sure you have the McKay story before you buy. Let us show you a McKay in operation . . . talk with the operators . . compare it in any way with any other similar machine and we're sure you'll specify McKay Roll Forming Equipment every time.

ENGINEERS AND DESIGNERS OF EQUIPMENT FOR THE AUTOMOTIVE, (Continued from page 180)

Weston Electrical Instrument Corp., Newark, N. J.

Indicator-5679 ea.-\$494,971

Weston Hydraulic, Ltd., North Hollywood. Calif. Valves—Various—\$333,034

Wm. R. Whittaker Co., Ltd., Los Angeles, Calif.

Spare parts—Various—\$27,090 Fuel valve—Various—\$72,588

Willys Motors Corp., Toledo, Ohio Spare parts-Various-\$80,130

troit, Mich. Power plants—3 ea.—\$2,807,511 Power plants-299 ea.

Wolverine Diesel Power Company. De-

BOOKS ...

THE AUTOMOBILE ACCESSORY IN-DUSTRY, by Ralph H. Warnhoff, published by Bellman Publishing Co., P. O. Box 172, Cambridge 38, Mass. Price, \$1.00. The full 32 pages of this booklet are devoted to an extensive survey of the automobile accessory industry from its early beginnings to its present place on the U. S. economic scene. Typical phases analyzed are: organization and structure; jobs which comprise the industry; qualifica-tions and requirements for entrance into the field; and the future of the industry. BORON STEEL, edited by Ernest E. Thum, published by American Society for Metals, 7301 Euclid Ave., Cleveland 3, O. Price, \$1.00. Included in this second revised edition is a wealth of material on boron steel. Numerous articles on many facets of the subject serve to give the reader a first-hand acquaintance with this important element

RADIATION SUPPRESSING COAT-INGS FOR METALS AT ELEVATED TEMPERATURES, by A. H. Sully, E. A. Brandes, and R. B. Waterhouse, published by Fulmer Research Institute, Ltd., Stoke Poges, Buckinghamshire, England. Price, \$2.50. The object of this report was to develop a refractory coating of low ther-mal emissivity which could be applied to s used in gas turbine construction which could withstand the severe alloys used in gas turbine construction and which could withstand the severe operating conditions encountered in cer-tain parts of such mechanisms. The work is divided into three principal parts; the is divided into three principal parts; the accurate measurement of the total emis-sivity of metal surfaces and of refractory substances and the variation of emissivity with particle size and thickness of coating; the investigation of methods of bonding refractory coatings to metal surfaces and the formulation of coating composition and methods of application; fatigue, thermal shock, and other tests to deter-mine the behavior of coatings under simulated service conditions.

CONVEYOR TERMS AND DEFINI-CONVEYOR TERMS AND DEFINITIONS, published by Conveyor Equipment Manufacturers Association, One Thomas Circle, Washington 5, D. C. Price, \$1.00. This manual was compiled to meet the pressing need for uniform terms and definitions for the many and varied types of conveyors. In writing the definitions, care has been taken to eliminate from coverage these kinds of equipment not ordinarily. those kinds of equipment not ordinarily considered as falling within the scope of the term "conveyors." Trade names have been avoided except in instances where long usage has made common property of

FIFTY YEARS OF FLIGHT, by Welman A. Shrader, published by Eaton Man-ujacturing Co., 700 E. 140th St., Cleveland 10, O. Price, \$5.00. This book is a chronicle of the aviation industry in America from 1903 to 1953. Beginning with the first powered flight by the Wright Brothers, it records the dates and highlights of the major achievements and out-standing events in America's aviation history. The 600 pictures used as illustrations are said to represent the largest col-lection of the nation's aircraft to be found in any single volume. A special fea-ture is an annual summary of each aircraft manufacturing company's activities.

A PROGRAM FOR EXPANDING JOBS A PROGRAM FOR EXPANDING JOBS AND PRODUCTION, published by Economic Research Dept., Chamber of Commerce of the United States, Washington 6, D. C. Price, \$6.50. This report discusses the economic problems which lie ahead for the U. S. and suggests both private and governmental steps which may be taken to maintain prosperity and an expanding economy. A typical subject covered is the measures which a business-man may take to help maintain producman may take to help maintain productive employment.

REPORT ON SURFACE PREPARA TION OF STEELS FOR ORGANIC AND OTHER PROTECTIVE COATINGS, published by National Association of Corrosion tished by National Association of Corrossion Engineers, 1061 M & M Bldg., Houston 2, Tex. Price, \$1.00. This report covers rec-ommendations and explains methods whereby the surfaces of steel may be pre-pared for painting with organic and other coatings by means of weathering, brushing, grinding, flame conditioning, nozzle blast cleaning both wet and dry, wheel blasting, chemical pickling, electrolytic pickling, surface conditioning and numerous other related methods, Accepted standards are discussed and safety measures indicated.





Burton Leaf Springs, installed on the heaviest motor transports by such manufacturers as The Dart Truck Company, are counted upon to give first-rate performance. These springs must prove in the field that they can withstand the rigors of rough terrain and heavy loads.

Burton is the choice of major manufacturers because they know Burton's experience and record. Burton has grown with the automotive transport industry, is familiar with its needs, and maintains exacting product standards. Its engineers strive constantly to uphold and improve the efficiency of the springs that support the rolling stock of the nation, both on and off the highways.

For your individual spring problem, consult with our engineers today.

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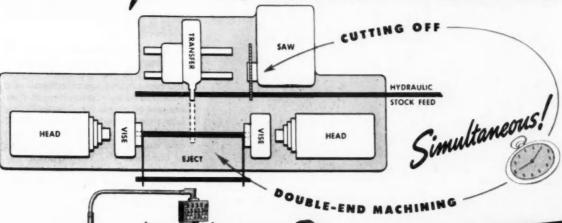
48th ST. at WESTERN AVE. Chicago 32, Illinois

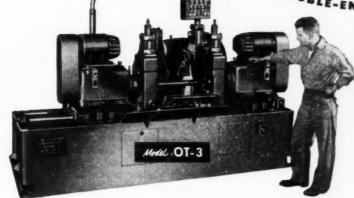
Variety..

CUT OFF while you DOUBLE-END MACHINE

on HOTCH & MERRYWEATHER

AUTOMATIC TRANSFER MACHINES!





BORE • FACE • CHAMFER • CENTER

DRILL • TURN • REAM • GROOVE

and other operations, singly

or "unitized"



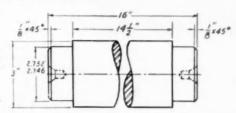
Three or four machines in one. Cut off to accurate length and double-end machine simultaneously. Cut-off time is virtually "free". Change-over quick from job to job! Ideal for short or production runs. Cycle fully automatic. Remember: it's the cost per piece that counts.

Case Study No. 182

Operation: Cut off, box mill, turn and center drill both ends.

Material: SAE 1020.

Production: 110 pieces per hr.



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ITEM	Model OT-3	Model OT-41/2	Model 2T-6	
Rated diameter stock	15" to 3"	¾" to 4½"	1" to 4"	
*Standard work length	8" to 40"	8" to 40"	8" to 40"	
Weight (approximate)	11,500 lbs.	15,000 lbs.	26,600 lbs.	

*Work length can be increased by special arrangement. NOTE: Supplied for ferrous or non-ferrous applications.

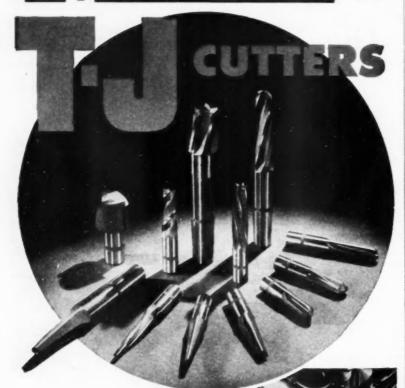
Manufactured by — THE MOTCH & MERRYWEATHER MACHINERY [O. —

Builders of Circular Sawing Equipment, Production Milling, Turning and Special Machines

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT



Raise the feed . . . Cut your die costs with . . .



LARGEST SELLING CUTTERS FOR TOUGH DIE STEELS

You get more work between grinds... with these extra rugged T-J Die Sinking Milling Cutters. That's why they're top favorites in die and forge shops everywhere! T-J Cutters are correctly designed for speed, accuracy and long life... hold a sharp edge longer... less breakage! Made from an extremely high grade steel... properly machined... scientifically heat-treated and accurately ground. Wide range

ground. Wide range of styles and sizes to reduce your die costs! Send for new catalog 4-153. The Tomkins-

Johnson Co., Jackson, Mich.

T-J Cutter at work on a Cincinnati 16"
Vertical · Hydrotel, latest design Die Sinker. A cutter of the right design and heat treatment for this high speed work in tough die steels, making possible maximum efficiency of these new machines.

FOR TOUGH JOBS SPECIFY

TOMKINS-JOHNSON

RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS

FJ



Nickel is expected to come off the restricted list by December, resulting in reinstatement of pre-Korean plating specifications. An NPA Advisory Committee of consumers of nickel for electroplating has recommended that all nickel except that needed for defense and atomic uses should be freed of controls. The Government, expected to accede to the request within the next two or three months, may be influenced by Canadian prices and markets after lifting of controls up north.

Interstate transportation costs are now slated to remain at their current levels through 1955. ICC turned down the request by carriers to make the temporary increases permanent.

Government contracts are to be awarded only to low bidders. Previous policy of permitting manufacturers in labor surplus areas to match low bids submitted from other areas is headed for the scrap heap.

Review of cases in which there has been denial or revocation of security clearances for defense contractors or their employes is the responsibility of three new federal industrial security boards, with offices in New York, Chicago, and San Francisco.

ODM has reestablished the Committee on Defense Transportation and Storage, to advise on transportation and storage problems and to review and advise on federal plans which may affect or require coordination of O.D.M.

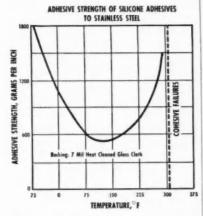
Reports from the states show bills affecting auto and truck equipment were considered by many legislatures this year. Twenty states discussed bills requiring mudguards on trucks and trailers, but only three put through new laws. Four states enacted safety-glass laws. Five states amended their brake laws.

Vol. I, Number 1

PUBLISHED BY DOW CORNING CORPORATION, MIDLAND, MICHIGAN

New Pressure Sensitive Silicone Adhesives Stick To Most Surfaces; Retain Their Excellent Adhesive Strength From -55F To Over 250F

The newest products to come out of our development laboratories are pressure sensitive silicone adhesives that stick to almost any materials including silicones and Teflon. Adhesive strengths in the range of 1800 grams per inch at $-55~\mathrm{F}$ and over 1200 grams per inch at 265~\mathrm{F}, are far superior to those of conventional pressure sensitive tapes. The adhesive strength between a stainless steel surface and glass tape coated with silicone adhesives is plotted against temperatures ranging from $-75~\mathrm{to}$ 285~\mathrm{F} in this Figure.

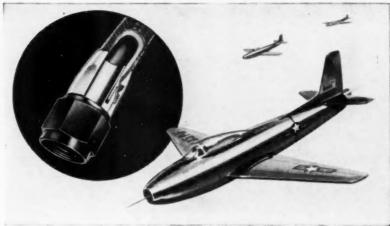


Uses for tapes coated with silicone adhesives include high temperature electrical and electronic applications; weather and moisture resistant wrapping and sealing tapes for low temperature applications. One electrical equipment manufacturer is already using these pressure sensitive adhesives to bond mica matt and integrated mica to glass cloth.

Silicone-based Aluminum Paints Outlast Organic Finishes 10 to 1 at Sterilizing Temperatures

Trays containing vials of aureomycin and other antibiotics at the Lederle Laboratories Division of American Cyanamid Company are loaded onto racks and sterilized for 3 hours at 446 F to destroy pyrogens.

The organic aluminum finish on these racks began to crack and peel, permitting rust to form, after 9 to 15 (continued page 2)



Flexible Silastic* Tubes Carry Air at 500 F; Prevent Engine Failure Due to Icing Over Jet Air Scoops

Reinforced with stainless steel braid, Silastic tubing requires minimum space; endures heat and high frequency vibration.

It was discovered shortly after certain jet engines were put into service that the formation of ice over air intake scoops could choke off the air supply and cause engine failure.

The obvious solution to this problem was to pipe air at 500 F from the compressor to the scoops. But that simple solution involved many problems.

The jet engines were so tightly fitted in their nacelles, that very little room was left for hot air ducts of any kind. High frequency vibration set up by the engine and plane introduced the problem of fatigue failure.

This was a job for a flexible tubing, a tubing that could carry hot air without melting, withstand the vibration and permit fast and easy assembly and disassembly. Engineers of the Aeroquip Corporation of Jackson, Michigan, solved the problem with flexible Silastic tubing. Reinforced with stainless steel braid, Silastic tubing is light and flexible. It is held mechanically to the stainless steel braid so tightly that the tube will not collapse even when subjected to a vacuum.

The high temperature problem of attaching a fitting to the hose was ingeniously solved by the new Aeroquip "Little Gem" fittings. The total assembly proved to be so effective that these anti-icing hoses have become standard equipment.

Despite internal and external temperatures as high as 500 F, the Silastic

hoses are still in excellent condition after hundreds of hours of service. Aeroquip has supplied thousands of them to jet manufacturers. From 5 to 20 are required per engine, depending upon its design.

The usefulness of Silastic in this application confirms data collected by our development engineers on effects of accelerated aging at high temperatures on the properties of Silastic. Heat resistant organic rubber becomes brittle in a few hours; Silastic 80 does not crack on flexing over a % inch mandrel, and hardness increases only 9 points after more than 670 hours of continuous aging with all surfaces of the test sample exposed in an air circulating oven at 480 F.

Silastic 80 readily meets SAE-ASTM Specification TA805 which requires that it have a minimum tensile strength of 500 psi; a minimum ultimate elongation of 50 percent. After 70 hours aging in an air oven at 450 F, increase in hardness is not more than 15 points; drop in tensile strength is less than 25 percent and loss of ultimate elongation, less than 40 percent.

In oil resistance tests, decrease in hardness is less than 45 points; increase in volume, less than 60 percent after 70 hours immersion in ASTM No. 3 oil at 300 F. After 70 hours immersion in ASTM No. 1 oil at 300 F, loss in tensile strength and ultimate elongation is less than 20 percent; decrease in hardness, (continued page 2)

MORE

NEW DEVELOPMENT AND TECHNICAL DATA

For copies of any of the publications reviewed in this column or for data relating to any of the articles printed in this issue of the Dow Corning Silicone News, simply circle the corresponding reference number on the coupon below.

Expansible resins. Two new silicone resins, Dow Corning XR-543 and XR-544, can be expanded to produce heat-stable, non-flammable, unicellufoams with densities from 8 to 24 lbs per cubic foot. Highly resistant to thermal shock these silicone foams show practically no structural or dimensional change after 20 hours at 700 F. Weight loss after 220 hours at 570 F is less than 2%; maisture absorption less than 0.05% after 7 days at 96% RH. Resins are easily foamed in place, made up as sandwich structures or machined with wood working tools. No. 5

Dow Corning 1109, a durable new silicone water repellent treatment for leather footwear, gloves, luggage and sporting goods; minimizes water absorption and transmission; improves resistance to oils and chemicals without changing the "breathing" characteristics of leather. No. 6

Now available, the new 1953-54 Reference Guide to Dow Corning Silicone Products summarizes properties and applications for commercially available silicones. A complete revision of previous guide which some designers have reported to be one of the most helpful catalogs ever produced.

Silastic 6-127 paste, an excellent cloth coating material and bonding agent for silicone rubber, retains good dielectric properties over a wide range of temperatures and frequencies. It has superior resistance to heat and moisture; remains No. 8 flexible down to - 100 F.

"Tall Tales and Fabulous Facts" is a new 24 page booklet built around the idea that, in our times, the tallest tales are told in technical terms. In this publication, the tall tales our ancestors told about such legendary characters as Paul Bunyan, Davy Crockett and Pecos Bill are related to some equally fabulous facts about Dow Corning silicone products. No. 9

Air drying silicone water repellent for application to glass, plastic and ceramic insulator badies and to electronic parts and components maintains high surface resistivity under humid conditions; minimizes adhesion of dirt and chemical dust; reduces maintenance. No. 10

DOW CORNING CORPORATION - Dept. CI-9

Midland, Michigan

Please send me: 1 2 3 4 5 6 7 8 9 10

NAME

COMPANY

TITLE

CITY

ZONE___ STATE

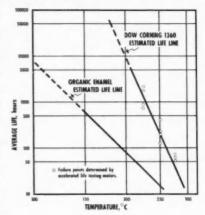
Small Electric Machines and Electronic Parts Can Now Be Designed to Operate at 180 C.

Life and reliability can be increased, or the size and weight of electronic devices and fractional or miniature motors can be reduced through the use of bare magnet wire insulated with Dow Corning 1360 Wire Enamel

Flexibility, scrape hardness and dielectric strength compare favorably with those of the best organic wire enamels. Dow Corning 1360 coated wire also shows superior resistance to a wide variety of solvents, oils and salt water.

The results to date of the accelerated life testing at temperatures in the range of 200 to 275 C of several electric motors wound according to standard commercial procedures with 1360 coated wire are plotted in the chart at right. These data show that motors wound with magnet wire insulated with Dow Corning 1360 Wire Enamel have a life in the range of 1500 hours at 225 C (437 F), compared with 30 hours for identical motors wound with the best grade of Class A wire.

Based on the results to date of this motor test program, we expect that the



life of machines wound with 1360 coated wire at 180 C will be comparable to that of identical machines wound with conventional Class A wire at their maximum operating temperature of 105 C.

Extrapolating from the data plotted above, we find that the life expectancy at 180 C of magnet wire insulated with this new enamel is in the range of 50,000 hours compared with 200 hours for wire insulated with the best organic enamels. No. 4

SILASTIC continued

less than 15 points. It shows no shrinkage and swell is less than 20 percent.

After 168 hours immersion in water at 158 F, swell is less than 10 percent and decrease in hardness is less than 10 points. It does not become brittle on continuous exposure at -65 F.

Silastic 80 offers another advantage in that it can be blended with Silastic 50 to fabricate parts having any Shore hardness between 50 and 80. These stocks can be blended to fabricate parts that meet SAE-ASTM Specification TA604. Heat-stable pigments can be used to give these stocks almost any desired color.

In electrical applications such as wire covering and cable coating, Silastic 80 retains excellent dielectric properties over a wide range of temperatures and frequencies. Cable insulated with Silastic 80 has a dielectric strength of 450 volts mil at 50 C; 430 volts mil at 250 C. No. 3

PAINTS continued

hours of such service. That introduced a costly hazard because any bit of rust or paint chips in a tray could cause rejection of a whole rack of carefully prepared antibiotics.

Some time ago, the racks were sand blasted, sprayed with a silicone-based aluminum paint. So far, the silicone finished racks have endured 150 hours at sterilizing temperatures with no sign of deterioration. As a result of that experience, Lederle is now using silicone-based paint to refinish sterilizing equipment throughout their plant.

At temperatures in the range of 500 to 1000 F. silicone-based aluminum finishes are used to protect stacks, exhaust mufflers, dryers, and furnaces. Modified silicone enamels in a wide variety of colors are used to protect appliances such as stoves, space heaters and incinerators at temperatures in the range of 400 to 700 F. No. 2

-		First Silico	
1	DOW	NING TION	

Atlanta Chicago Cleveland Dollas Detroit Midland, Michigan Los Angeles New York Washington, D. C. (Silver Spring, Md.)

In Canada: Fiberglas Canada Ltd., Toronto In England: Midland Silicones Ltd., London

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Silicone Fluids Silicone Abhosives Silicone Adhosives Silicone Adhosives Silicone Release Agents Silicone Release Agents
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Silicone Bonding Resins
Silicone Electrical Insulating Varnishes
Silicone Molding Compounds
Expansible Silicone Resins
Silicone Detaamers
Silastic

New Products

For additional information please use postage-free reply card on page 73

(Continued from page 72)

Radiator Test Bench

Recently announced is an improved type of combination radiator test and repair bench. Designated as the Model J-60, it is claimed to cut labor time by 50 per cent.

The work of lifting heavy radiators in and out of testing tanks is said to be eliminated by incorporating an electric elevator into the unit. The elevator is powered by a ¼ hp motor.



Construction of the test and repair bench is reported to be of prime quality 10-gage steel with all seams welded inside and out. It is 70 in. long by 38% in. wide. Accessories include an air blow-gun and manifold, soldering torch and manifold, air-pressure regulator and gage, air filter, and pilot light. Inland Manufacturing Co.

Circle 40 on page 73 for more data

Versatile Rivet

Recently introduced is a rivet that reportedly makes "blind" spots as easy to handle as open sections and that can be driven without a dolly. It is claimed that the rivet can be driven by even inexperienced operators at a rate of up to 1200 an hour.

Known as the "Pop" rivet, the unit is available in Monel and aluminum. Deep drawn from strip stock, it can be used to fasten most commercially available metals and alloys. J. C. Rhodes and Co.

Circle 41 on page 73 for more data (Turn to page 188, please)



New Products

For additional information please use postage-free reply card on page 73

(Continued from page 187)

Battery Chargers

Recently announced is a line of battery chargers for use on both six and 12-v batteries. The first is a fast charging unit called the Saf-T-Taper. Automatic adjustment of the starting rate of charger to the exact amperage rate that the battery will take safely without overheating is its prime feature.

Also available for six and 12-v charging are a utility charger and a trickle charger. The first reportedly will recharge a normally discharged six or 12-v battery overnight.

The trickle charger is said to maintain automatically six or 12-v batteries or any combination of six and 12-v batteries up to a total of 30 cells, without dials, knobs or moving parts. Bowers Battery & Spark Plug Co.

Circle 42 on page 73 for more data

Clutch Compound

Recently introduced is a compound that is said to correct clutch slippage caused by glazing or oil present on the surfaces. It is a powder alloy of copper, silver and lead, in controlled proportions, designed to create a surface adapted for severe usage. The metals are suspended in a resin body so that the compound may be brushed on surfaces. Cop-Sil-Loy, Inc.

Circle 43 on page 73 for more data

Terminal Block

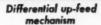
Now on the market is a device known as Lok-A-Blok, which is said to enable users to build their own terminal blocks in various lengths and combinations up to 25 poles without waste. This molded terminal block reportedly has good electrical and physical properties.

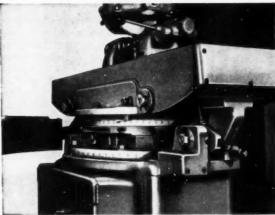
The unit consists of three simple parts which, it is claimed, can be assembled in a short time without tools: Red Lok-A-Boks which house the solderless connectors; the solderless connectors; and a yellow Lok-Strip which holds the assembly together and acts as an identification strip as well.

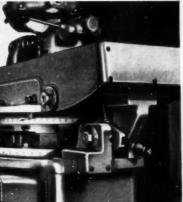
(Turn to page 190, please)



In Important Contribution







Crowning cam and bracket

Two new features are now optionally available with the Red Ring Gear Shaving Machine Model GCU - Automatic Differential Up-feed and Conventional Crowning. So equipped, any of the recognized processes in the field of rotary gear shaving may be performed on this machine. It thus becomes economically applicable to both high production and to job shop operations and to gears of all characteristics within its size range.

Specifically the Model GCU with these additions can be used for:

- (1) Diagonal shaving at fixed center distance on a two stroke cycle.
- (2) Diagonal shaving on an automatic multi-stroke cycle with selected increments of up-feed and dwell.
- (3) Conventional shaving on an automatic multistroke cycle with selected increments of up-feed and dwell.
- (4) Precision gear crowning accomplished by rocking the table during any conventional shaving cycle.
- (5) Taper shaving to specification.

Automatic cycling is precise and very fast. Production rates are high and cutter life has been increased to as much as 200%.

Write for Bulletin S53-7 which gives all the details of this important new development.

6501



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New Products

For additional information please use postage-free reply card on page 73

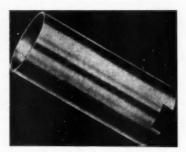
(Continued from page 188)

The lugs or connectors used are produced from pure electrolytic copper. On live metal parts the device has a clearance "over surface" of % in. and "thru air" of 1/2 in. Ilsco Copper Tube and Products, Inc.

Circle 41 on page 73 for more data

Cylinder Sleeves

Now in production is a line of cylinder sleeves called Dura-Cast. They are said to be factory cut-to-length for car, truck, and tractor engines.



The sleeves are available in wall thicknesses of 1/16, 3/32, and 1/8 in. They are made of centrifugally cast. controlled iron containing chromium, vanadium, manganese, and other alloying elements. They are reportedly heat-treated for proper Brinell. Dura-Bond Engine Parts Co.

Circle 45 on page 73 for more data

Silicone Rubber

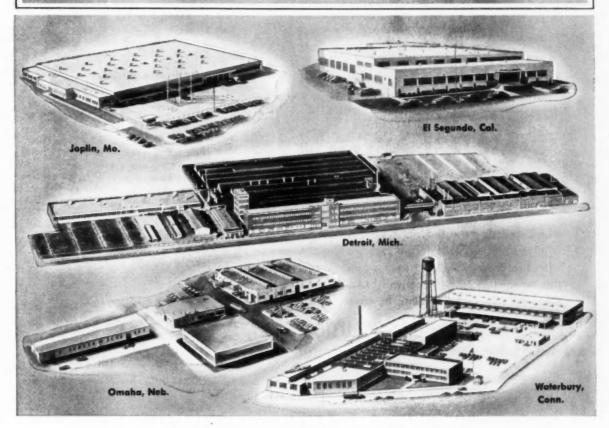
Recently announced is a putty-like silicone rubber coating compound for electrical insulation. It is also said to be useful for such non-electrical products as heat resistant engine gaskets and flexible heater ducts.

Called SE-100, the rubber is said to have good abrasion resistance. It reportedly remains flexible at -60 C. and neither softens nor flows at 315 C. It is supplied as a 100 per cent solids material or as a 35 per cent solids dispersion in xylene. General Electric Co.

Circle 46 on page 73 for more data (Turn to page 192, please)

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639

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

AUTOMOTIVE INDUSTRIES, September 15, 1953



TO PROVIDE A CONVENIENTLY OPERATED CONTROL

The designer of a cabinet type oil heater had to provide a manual control for an oil and air metering valve which was placed at the bottom of the unit. He wanted to place the control knob on the front of the heater where it could be easily seen and operated. To do this meant bringing the control linkage around a 90° turn. To solve the problem, he chose

THE LOW-COST SOLUTION AN S.S.WHITE REMOTE CONTROL FLEXIBLE SHAFT



In this way he was able to connect the control dial to a rod running to the valve with a single part which did not require alignment and could be installed in a minimum amount of time. The net result was impressive savings in assembly and manufacturing costs, advantages that

most designers gain when they use S.S. White flexible shafts to solve their remote control problems.

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New Products

For additional information please use postage-free reply card on page 73

(Continued from page 190)

Portable Riveter

Recently introduced is a portable pneumatic riveter (Airflex Model SP) featuring rotating impact.

The tool is said to require only a slight steady pressure for proper opertion. The spinning action reportedly eliminates any extreme jumping and contributes to smooth operation. The manufacturer states that the unit permits quality riveting on short pilotrun jobs, saves on handling and set-up time, and speeds up production.



Containing only 26 parts, the new tool weighs seven lb and measures 15 in, in length. It is claimed that this compact construction assures a minimum amount of maintenance and reduces operator fatigue.

The riveter is available in three sizes to handle 1/4 in. to 5/16 in. rivets. Lemert Engineering Co., Inc.

Circle 47 on page 73 for more data

Plastic Coating

Recently developed is a plastic coating for use as both protection and color identification on insulated refrigerant, cold water, steam and other lines and insulated equipment. Known as Insulcolor, it reportedly can be either brushed or sprayed on.

It is claimed that the coating will withstand temperatures to 160 F without cracking, shrinking, or crazing. It is available in white and six colors. Armstrong Cork Co.

Circle 48 on page 73 for more data (Turn to page 194, please)



 Seldom has there been developed a wire cloth so desirable and so usable, for so many needs, and for so many products. It's the new Reynolds Copperply. Woven of steel-core wire, coated with copper electro-

lytically applied - its perfect concentric coating may be of any thickness desired. "Handsome is" in appearance, with its richly red copper color. "Handsome does" in performance, with its strength of steel,

combined with copper's advantages. Nonrusting and enduring...corrosion resistant... high in electrical conductivity . . . dissipates heat quickly. And Copperply may be readily welded, soldered, or brazed.

Name the weave, mesh, and wire size ... the exact gauge of steel wire core, and thickness of copper you want-and you can have it-in Copperply wire cloth.

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> * Trade Mark, National Standard Company.

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TOOLS FOR INDUSTRY and SPECIAL MACHINERY

ATTERNOON AND ADDRESS AND ADDR

New Products

For additional information please use postage-free reply card on page 73

(Continued from page 192)

Regulator-Generator Unit

Now on the market is a regulatorgenerator servicer, identified as Model E-1256, which is said to contain in one compact unit all necessary instruments and tools to do testing and overhauling of both six and 12-v passenger car generators and regulators.



The master control unit contains voltmeter, ammeter, field rheostat, carbon pile, armature growler, regulator mount, pre-heat oven, and 1½ hp, 220-v, 60-c motor. Mounted on the bench are universal generator vise, armature lathe, and mica undercutter.

The pole shoe spreader and screwdriver, and puller press accessories are also included with the unit. Allen Electric and Equipment Co.

Circle 49 on page 73 for more data

Chrome Protector

Recently announced is a transparent chemical formula designed for protection of automobile chrome against rusting and pitting. Called Chromaloc, one coating is said to provide full-year protection against corrosion. It is claimed that the compound can be easily removed when desired with gasoline or any type of ordinary cleaning fluid. Haldane-Blake, Inc.

Circle 50 on page 73 for more data (Turn to page 196, please)



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PRODUCTION...



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THE HARTFORD SPECIAL MACHINERY CO. + HARTFORD 12, CONN.



New Products

For additional information please use postage-free reply card on page 73

(Continued from page 194)

Air Control Valves

Recently announced is a line of solenoid pilot-operated air control valves. They are available for threeway, four-way, and four-way, fiveport (two pressure) application in pipe sizes 14 in. through one in. The valves are furnished either for foot mounting or sub-base manifold mounting. A total of 30 new units is included in the line to handle any type or size of application requirement.

It is claimed that all parts are noncorrosive. There is no spring in the main valve, since air from the pilot valve is utilized to reverse the spool in both directions. The spool is the one moving part of the main valve body, and all parts are accessible without disturbing the piping to the valve.



The pilot valve control unit is manifolded with cap screws to the main valve body. An optional manual override is available for the pilot valve, which is said to make operation possible when electric current is off or when cylinder control set-ups are of importance.

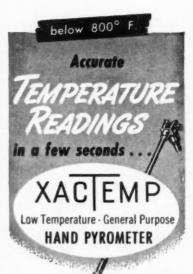
The solenoid coil is replaceable and is available in any a-c voltage and cycle, including all d-c requirements. Maximum current consumption at any voltage is reportedly only 10 w.

SCREWS

BOLTS

NUTS

The exhaust port is common for both the pilot and main valve and is (Turn to page 198, please)



Type LT-840 Low temperature **Xactemp Pyrometer** with rigid extension arm and surface tip thermocouple.

1001 USES

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New Products

For additional information please use postage-free reply card on page 73

(Continued from page 196)

the next pipe size larger than the inlet and cylinder ports to assure fast cylinder exhaust. It is claimed that valves can be mounted in any position.

All models are for air pressure from 35 to 150 psi and for low-pressure oil hydraulic service. Valvair Corp.

Circle 51 on page 73 for more data



Portable Hot Plate

Now on the market is a portable hot plate, known as Pyrodisc, for small-volume work. Sheathed nichrome heating elements are cast into the aluminum top plate to insure quicker heating (750 F in 35 min). good uniformity, and long element life.

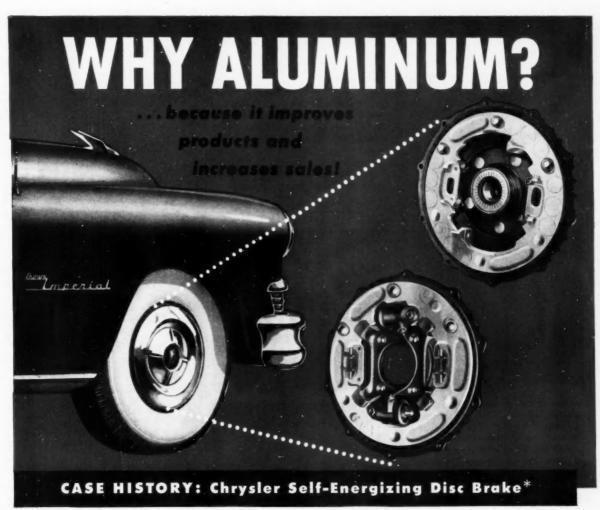
The unit has a diameter, top plate and base of eight in., power rating of 660 w; power service of 115 v, 50/60 cycle; and an approximate shipping weight of 10 lb. Laboratory Equipment Div., Lindberg Engineering Co.

Circle 52 on page 73 for more data

Power Timing Light

Now on the market is a combination power timing light that operates on both six and 12-v circuits. Designated as Model ATL-50, it contains a built-in voltage selector that is said to adjust itself automatically to battery input. It is claimed that the unit also permits high-speed testing of en-

(Turn to page 200, please)



*Standard Equipment on Crown Imperial Models

Two, lightweight, cast aluminum pressure plates are used in the advanced design Chrysler Disc Brake to quickly dissipate heat generated in braking. This is one example of how aluminum's superior heat transfer can be used to advantage . . . in this case to improve braking efficiency and to prolong brake life.

Other advantages that are proving equally beneficial to manufacturers and operators of cars and trucks include aluminum's low cost, light weight with strength, ease of fabrication, electrical conductivity and corrosion resistance. These factors have influenced the widespread use of aluminum for pistons, transmission and torque converter parts, carburetor bodies, generator and starter parts, battery trays, window

frames, trim and a host of other parts and accessories. For more information send for the free folder, "Here's What The Automotive Industry Is Doing With Aluminum."

In almost every industry a change to aluminum has provided manufacturing economies, improved designs and, at the same time, increased sales appeal. Ask Reynolds Aluminum Specialists to help you apply aluminum's advantages to your products and production.

Call the nearby Reynolds office listed under "Aluminum" in your classified telephone directory. Also write for complete index of design and fabrication literature. Reynolds Metals Co., 2587 S. Third Street, Louisville 1, Kentucky.

"Mister Peepers" returns September 13th on NBC-TV. Consult local listing for time and station.

REYNOLDS



ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND

New Products

For additional information please use postage-free reply card on page 73

(Continued from page 198)

gines up to 2500 rpm without affecting operation. Auto-Test Inc.

Circle 53 on page 73 for more data

Valve Refacer

Recently introduced is Model K500 valve refacer. It is said to grind wet or dry and is equipped with a large five-in. grinding wheel.

Valve face angle range is from zero to 90 deg with positive-stop feature and minus one deg setting. One valve feeds coolant to either grinding wheel. Standard equipment includes a diamond dresser, micrometer butt grinding attachment assembly for grinding valve stems, tappets, and rocker arms, the manufacturer states.

Valve stem capacity is 9/32 in. to 9/16 in. with standard equipment collet and can be increased for a range of 7/32 in. to 11/16 in. with extra equipment collets. It will reface valves with heads up to four-in, diameter within the valve stem range.



Model K500 has a 1 3 hp motor, single-phase, 60 c, 115 or 230 v, ac only. A model K500U is available with a 1/2 hp universal motor, single phase, ac-dc, 115 or 230 v, only. K.O. Lee Co.

Circle 54 on page 73 for more data

Battery Charger

Now available is a light-weight, allpurpose portable battery charger for charging both six and 12-v batteries. Known as Model 207 selenium-plate Slo-Fast charger, the unit is said to weigh only 15 1/2 lb. Marquette Manufacturing Co.

Circle 55 on page 73 for more data



Cigarette Lighter

Recently announced is an automatic cigarette lighter, known as Cig-O-Mat, which plugs into present car cigar lighter attachments.

The cigarette is inserted in the unit, a button at the base is pressed, and when it clicks the cigarette is lit. Seaboard Steel & Plastic Corp.

Circle 56 on page 73 for more data (Turn to page 202, please)



In four decades of service to the automotive industry, Leece-Neville has developed the ability to design and produce special units. Our staff and equipment for this purpose are outstanding and we welcome the opportunity to custom-engineer special and heavy-duty electrical equipment to meet particular problems.



For Example: Alternator Systems



Leece-Neville has developed dozens of different models of AC-DC Alternator Systems for such applications as passenger car, truck, bus, offhighway, railroad and marine. They have been proved by performance for over 7 years.

Capacity ranges for various system voltages include: to 95 amps for 6 volt; to 180 amps for 12 volt; to 100 amps for 24 volt; to 50 amps for 32 volt.

As in all Leece-Neville units, rugged design and precision manufacture combine to give L-N Alternators unmatched reliability and extreme life. Be sure to specify Leece-Neville. For all the facts, write The Leece-Neville Company, Cleveland 14, Ohio.

L-N custom-engineered products include: **ALTERNATOR SYSTEMS** D. C. GENERATORS **CRANKING MOTORS** SMALL MOTORS FOR HEATERS, etc. REGULATORS **SWITCHES AIR CRANKING MOTORS**









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models of Littell Straightenin Machines straighten coil stock of all standard widths and thickness No. 308 series straightens stock from a fraction of an inch to 8' wide, and from .018 to .065' thickness. No. 4 series straightens stock from a fraction of an inch up to 12" wide, and from .065 to .125" thick. Variable speed transmissions are adjustable to the requirements of presses, shears or slitters.

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Consdign Associates . CANEFCO LIMITED . Toronto 1, Canada

New Products

For additional information please use postage-free reply card on page 73

(Continued from page 200)

Bonded Lubricants

Recently announced is a group of three surface bonded lubricants. Marketed under the trade name, Surf-Kote, H-108, H-110, and H-205, are colloidal dispersions of a modified molybdenum disulfide in various types of resinous binders. They are said to be easily applied, by spraying or dipping with usual paint and enamel department equipment, to a variety of metallic surfaces. Operating temperatures range from 100 F to 950 F. Hohman Plating & Mfg., Inc.

Circle 57 on page 73 for more data

Synthetic Resins

Recently developed are two synthetic resins which are said to improve the impact strength and toughness of molded plastic products. Known as Plio-Tuf, the resins are white free-flowing powders which can be made into sheets, rods, or tubes by calendering or extruding. Chemical Div., Goodyear Tire & Rubber Co.

Circle 58 on page 73 for more data

Sealed Bearing

Recently developed is a sealed bearing for industrial casters and wheels that is said to seal grease in and

Described as a labyrinth-type seal, the unit is reportedly free-running, with an absolute minimum of friction or drag. Bassick Co.

Circle 59 on page 73 for more data

Building Protector

Recently developed is a product that is reported to resurface, protect, and beautify the exteriors of commercial. well as residential, structures against the weather. The compound contains two insulating and protective materials (asbestos and mica) and is air-blasted to the surface of the structure under pressure.

The product is available in 11 colors. It is said by the manufacturer to be equal in thickness to 10 or more coats of paint. Re-Nu-It Corp.

Circle 60 on page 73 for more data



Automobiles . . . and The National City Bank of New York

The most amazing feature of an automobile plant is outside it!

If you were to ask a visitor from another country what impresses him most about American automobile factories, you might get a surprising answer. Our guess is he would pass completely over the wonder of the assembly lines, and make no reference to the superpowered "cars of the future" that will be rolling off them soon.

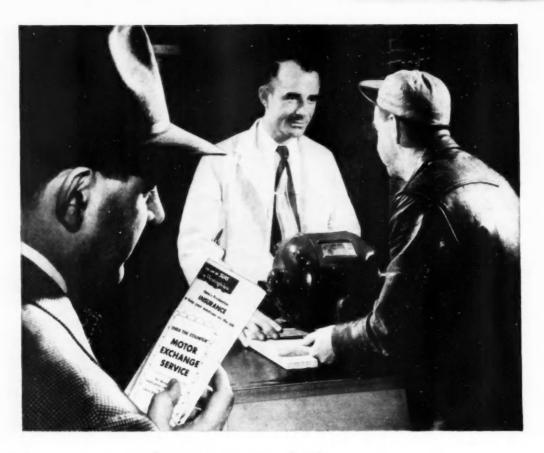
He probably wouldn't even refer to the astounding total of \$5 billion in special taxes collected on motor vehicles in 1952, or the 900,000 people who earned nearly \$3 billion making automobiles and trucks that year.

What he'd most likely mention first is the size of the parking lot around each factory! In other countries such lots are small. Only comparatively few of the top executives can afford automobiles. Only in America do we need plant parking lots acres in extent—large enough to park a car for every employee! This fact symbolizes the triumph not only of the American automobile industry, but of all American enterprise.

Like many other industries, large and small, the automobile industry has found the extensive resources, long experience and farreaching domestic and overseas facilities of The National City Bank of New York extremely helpful. If we may be of service to you in your business or personal banking, please write or call The National City Bank of New York, 55 Wall Street, New York City.

Member Federal Deposit Insurance Corporation

First in World Wide Banking



Here's how to cash in a crippled motor for a fully guaranteed replacement

Through the Westinghouse Motor Exchange Plan, your company can release money tied up in stand-by motors and renewal parts... money that can be profitably employed in your own production. Under a most unique service policy, Westinghouse has set up a motor replacement pool for crippled motors. This Motor Exchange Plan makes available to you an immediate, fully guaranteed replacement for single or three-phase Life-Line* motors, under 20 hp, in frame sizes 203 to 326.

Quick over-the-counter replacement of Life-Line motors is handled at exchange points in 127 key manufacturing and production centers. If you are not located near such a warehouse, your local Westinghouse Sales Office will gladly expedite shipment of a replacement motor to your plant.

With fast service of this kind, you can substantially reduce or eliminate stand-by motors and renewal parts. You'll find, too, that using the Motor Exchange Plan will release maintenance, labor and equipment, necessary for repairing motor damage, to work on more important jobs.

Investigate the Motor Exchange Plan soon with your local Westinghouse Salesman. He will leave with you a complete description of the plan contained in this pamphlet, SM-5243; or write today for this information, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-21743

*Trade Mark



FOOLPROOF INDICATOR



Readings at any point are identical whether approach is from front, back, or either side, with this new supersensitive AIRETEST precision indicator.

Free from HYSTERESIS—no lag, no drag—a movement of a few millionths is instantly indicated.

<u>Cannot stick</u>—the only movement is the flexing of a steel reed pivot—no gears, rack, cams, etc.

Much greater amplification—1,000, 2,000, 5,000 or even 10,000 to 1, as contrasted with 400 to 1 of conventional indicators.

Order Now for Immediate Delivery of complete kit as shown, with or without Column Precisionaire instrument. Kit price \$97.00. Stand price \$97.00. #1M or #2M Column Precisionaire, price \$265.00, f.o.b. Dayton. Wire or write for demonstration in your plant.

REPETITIVE READINGS POSITIVELY ASSURED

ACCURACY Heretofore UNKNOWN in TOOL ROOM MEASURING

No figuring to correct for stylus angle—setting to a universal master block automatically corrects for angularity of stylus arm in that position. Calibration is quick.

"Pencil Slim" to enter hard-to-get-at places

—easily goes into holes, slots, grooves, etc., impossible to get at with indicators.

GOES ON MOST STANDARD HEIGHT GAGE STANDS



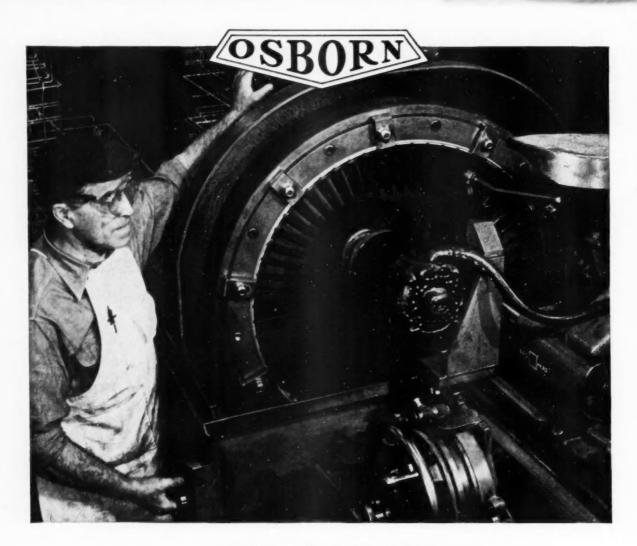
6337



the Sheffield corporation

GAGES • MEASURING INSTRUMENTS
MACHINE TOOLS • CONTRACT SERVICES
THREADING TOOLS

REPRESENTATIVES IN PRINCIPAL COUNTRIES . In Australia, the Sheffield Corporation of Australia Pty. Ltd., Melbourne



This wheel of fortune pays 20 to 1 on every turn

Qu one winte this machine does a job that formerly required 30 minutes! It shows what you can do with new OSBORN Power Brushing techniques to speed your production and cut costs.

The job consists of deburring ends of stainless steel blades of a jet engine stator assembly. Chucked up in a grinder, as shown, the assembly rotates counter-clockwise at 20 rpm. An 8-inch grinding wheel grinds the

ends of the vanes. Burrs and feather edges are then removed by two OSBORN 10-inch Monitor. Brushes rotating at 2800 rpm—45 seconds in each direction. The complete cycle takes 1½ minutes. Vane ends are made uniformly smooth, 20 times as fast as former hand method.

The answer to your production problems may be found with special Osborn-equipped machines such as this . . . or with one of the Osborn Brushing Machiner which are being

used in scores of plants for high-speed deburring. For any problem in deburring, cleaning and finishing, start tackling it with the powerful experience of your Osborn Brushing Analyst. Call him or write The Osborn Manufacturing Company, Dept. E-9, 5401 Hamilton Avenue, Cleveland 14, Obio.

FREE: New booklet on deburring with Osborn Power Brushing. Write for your copy.





OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

Do you need the solution to a tough, high-production metal-working problem?

If you do, Kearney & Trecker's Special Machinery Division has the "know-how" and capacity to design and build the special equipment you need

SINCE 1898 Kearney & Trecker has been aiding the metalworking industries by overcoming production difficulties with special machines and tooling or adaptations of standard equipment.

Today, its Special Machinery Division is in a better position than ever before to help you with your problems. It has a new \$5,000,000 plant to work in . . . and over \$2,500,000 worth of new tools to work with. The Special Machinery Division is staffed by almost 100 design, project and production engineers plus a full complement of skilled machinists and floor men.

Take the first step now

Get in touch with your Kearney & Trecker representative or contact the factory. In response, one of our Senior Project Engineers will promptly visit you and make a field analysis of your requirements. There's no obligation, of course.

Our Customer Engineering Service takes over your production headaches

After all the facts have been gathered, a team of Project Men in our Customer Engineering Service will review the job. These widely-experienced, practical-minded men will check the work-piece itself . . . how to hold, machine and process it . . . and every other contributing factor. They'll develop preliminary sketches and get started on a proposal.

You get quality equipment, delivered when promised, carefully installed

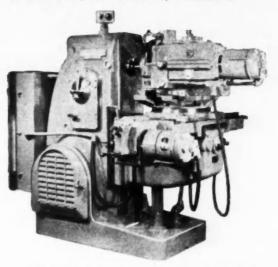
As the Special Machinery Division is an integral part of the Kearney & Trecker Corporation, every product is fully supported by the entire organization's financial, physical and personnel resources. This means that, in addition to the machine or ma-

chines of exceptional quality that will solve your difficulties, you get delivery as promised plus fully supervised installation and followup service.

We invite your inquiry

We'll be glad to provide you with any information we can. This includes sample machine specification sheets on typical special machine installations, a brochure covering the expanded facilities of our Special Machinery Division, and details on our Customer Engineering Service.

Write, wire or phone the Special Machinery Division, Kearney & Trecker Corp., 6784 West National Ave., Milwaukee 14, Wisconsin.



It is not always necessary to design a completely new machine. Here's an example where a standard milling machine column has been fitted with a specially designed fixture. Its job — to produce face, plate and barrel cams of differing sizes.





N BOSCH

SMALL ELECTRIC A LARGE FAMILY MOTORS FOR AUTOMOTIVE SERVICES

> High torque type ... sturdy, quiet, well built ... with characteristic American Bosch precision quality. Many in wide use as original equipment on automotive vehicles. If you have a decimal horsepower motor requirement in YOUR Equipment -put the problem up to: American Bosch Corporation, Springfield 7, Massachusetts.

> > ALL ELECTRIC MOTORS FOR:

WINDSHIELD WIPERS · WINDOW LIFTS · SEAT ADJUSTERS TOP LIFTS . HEATERS AND OTHER MECHANISMS



















AUTOMOTIVE INDUSTRIES, September 15, 1953

Take a closer look at the

FORMABILITY

of B&W mechanical tubing You'll like it



When selecting tubing for forming into any part or product, the fabricator should be certain that the tubing has the optimum combination of formability and structural strength required by the product . . . should also consider the ease with which it can be formed—hot or cold—with his available equipment.

Whether you specialize in forming, or fabricate formed specialties only occasionally, B&W Mechanical tubing can be supplied to meet the specific requirements of practically any end use. It is available in the broadest range of analyses, sizes, finishes, and properties, to simplify and reduce your forming operations to the minimum consistent with product requirements.

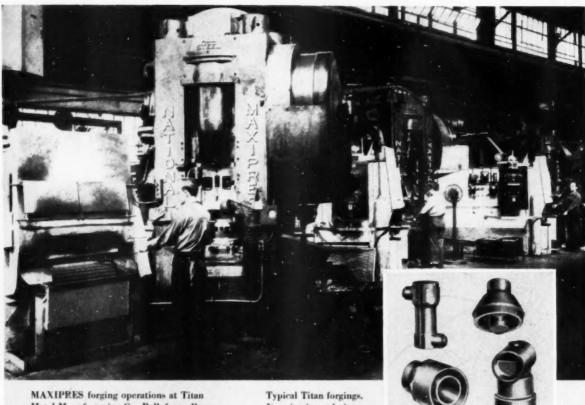


THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION

leaver Fells, Pa.—Seamless Tubing; Welded Steinless Steel Tubing Alliance, Ohio—Welded Carbon Steel Tubing

Mr. Tubes — your nearby B&W Tube Representative — is always available when you need help in matching tubing types to your facilities and job requirements. Get the benefit of his long, close association with mechanical applications of every type, to keep your production up and costs down.

TA-1750(M)



Metal Manufacturing Co., Bellefonte, Pa.

Note intricate designs.



3600 TOTAN Forgings Per Hour ... from this battery of **HIGH SPEED FORGING MAXIPRESSES!**

Titan Metal Manufacturing Co., Bellefonte, Pa., specialists in quality brass and bronze forgings, is achieving outstanding production rates with this battery of three National High Speed Forging MAXIPRESSES, which reach 1,200 forgings per press per hour!

Titan forgings, many of intricate shapes with thin wall sections, vary in weight from less than one ounce up to 100 lbs. They are precision forgings, due in part to the over all ruggedness and built-in rigidity of the MAXIPRES.

If you have a forging problem-large or small, hot or cold - ferrous or non-ferrous - let us help you solve it. Send us prints, or a sample part, or, better yet, visit us. No obligation.

DESIGNERS AND DUILDERS OF MODERN FORGING MACHINES . MAXIPRESSES . REDUCEROLLS . COLD HEADERS . BOLTMAKERS . NUT FORMERS . TAPPERS . NAILMAKERS

Hartford

Detroit

Chicago



On Our Golden Anniversary we salute the ONE OF A SERIES

Automotive Industry

"Get out and get under" was the rule rather than the exception in the infancy of the automotive industry at the turn of the century. A short trip then was a major undertaking, and any tour of 50 miles invariably required roadside delay for mechanical repair.

Today's cars, mass-produced for the pleasure of millions of Americans, are engineered not only for outstanding new-car performance, but also for years of continued dependable travel that has made all America as easily accessible as the corner drug store.

On the occasion of their 50th anniversary Burgess-Norton salutes these engineers and production men, and are proud that B-N piston pins and other precision parts have contributed to the dependable performance of the nations automobiles.

BURGESS-NORTON MFG. CO.

SERVING INDUSTRY FOR 50 YEARS













Engineered to Out-Perform ... and BUILT TO LAST

CONTINENTAL



For more than 50 years, Continental has been engineering power plants to do more useful work per pound of engine weight, and building them to run longer with less time out for repairs. Materials flow more steadily and at lower ton-

mile cost, when they move to the job in trucks with dependable Red Seal power. And the range of the Red Seal line — 28 basic models, Diesel and gasoline—assures exactly the right engine for every commercial transport job.

Continental Motors Corporation

MUSKEGON, MICHIGAN

1819 BROADWAY, NEW YORK 23, NEW YORK + 6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS + 3817 S. SANTA FE AVE., LOS ANGELES 58, CALIF.

910 S. BOSTON ST., ROOM 1008, TULSA, OKLA. • 1252 OAKLEIGH DRIVE, EAST POINT (ATLANTA) GA.

TRANSUE FORGINGS

USUALLY COST LESS AT THE POINT OF ASSEMBLY



High alloy steel aircraft forging weighs 5 lbs.; extreme care in heating the metal to proper forging temperature and forging to close tolerance are required.

Consult our engineers when you are contemplating conversion to forgings or when you are in need of reliable forging service.

TRANSUE & WILLIAMS

STEEL FORGING CORPORATION . ALLIANCE, OHIO

SALES OFFICES: NEW YORK . PHILADELPHIA . CHICAGO . INDIANAPOLIS . DETROIT . CLEVELAND

OVER 50 YEARS OF FORGING PRODUCTION EXPERIENCE



IT'S THE ROAD TO SUCCESS...

THE
FAMOUS
ORIGINATORS
OF
NEEDLE CARTRIDGES
AND
NEEDLE BEARINGS
WITH NEEDLE RETAINERS

loose needles

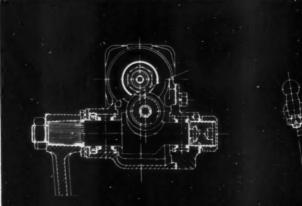
needle cartridges

complete bearings









Steering gear

King pin (Front axle)

133 à 137 BOULP NATIONAL



RUEIL-MALMAISON (S.O.) FRANCE

give the GO -signal to



for guaranteed phosphate coating

Detrex has been working with phosphate coatings for rust prevention and better paint adhesion for over twenty years.

Today, Detrex phosphate coatings have gained rapid acceptance by manufacturers of painted products from coast to coast. This acceptance is based on proven advantages . . . exceptional rust protection for metal surfaces, excellent fine-grained crystalline structure that literally locks paint to the metal, and economy and ease of application.

There is another important reason for the growing popularity of Detrex phosphate coatings . . . Detrex One-Stop Service. This exclusive Detrex service places the responsibility for the complete process in the hands of one competent company. On present operations, both cleaning and phosphating chemicals are produced by Detrex—on your new applications, Detrex produces the equipment, too. In either case, the results are guaranteed!

For a more durable paint finish, for economical, easy-to-control processing, for guaranteed performance—give the GO-signal to Detrex.

for free survey

At no obligation to you, the Detrex field man in your area will come in and survey your present or proposed operations. There is no cost for the service. The result will prove to you the money-saving advantages of Detrex service. Just fill out and mail the coupon below . . . our field man will call you for the most convenient time to come in.

DETREX CORPORATION, DEPT. 304, BOX 501, DETROIT 32, MICHIGAN

Please have the Detrex man in our area make an appointment to survey our operations to point up ways of cutting cleaning costs.

NAME

COMPANY

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DETREX CORPORATION

DEGREASERS • DEGREASING SOLVENTS • WASHERS
ALKALI & EMULSION CLEANERS • DRYCLEANING
EQUIPMENT • PHOSPHATE COATING PROCESSES



UNIT No. 1



Capacity.

80.

CYLINDER BLOCKS
AN HOUR

379



GREENLEE



Performs 76 operations in 43.8 seconds. Drills, c'sinks, c'bores, and trepans. Tilts part at station No. 1 to 180° for subsequent machining. Automatically gauges and cleans drilled holes at station No. 20.

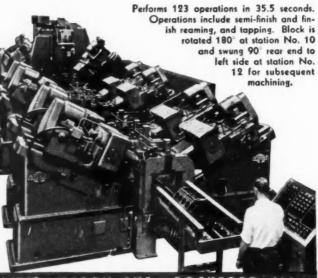
TRANSFER MACHINES

When you see these big Greenlee transfer machines working — turning out a tremendous quantity of work so smoothly and easily — you realize the qualities that make them great. Here is power, precision, durability, and a vast multiplicity of operations in a compact, integrated production line. Here is modern mass-production for component parts in its most successful form.

Concrete evidence of our experience and capability in designing and building Transfer Machines is exemplified with installations like this three-unit production line, now at work for a leading automotive concern.

UNIT No. 3





GREENLEE BROS. & CO. 1759 MASON AVE., ROCKFORD, IL

MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES . AUTOMATIC SCREW MACHINES . AUTOMATIC TRANSFER PROCESSING MACHINES

Operating Cost!

for many metal working operations—especially grinding of all types

Filters all water based or mineral oil coolants used in individual machine tools or small central systems.

Heudaille



16,000 SQ. INCH FILTERING AREA

Assures complete removal of chips, abrasives, dirt and other solid contaminants. Keeps coolant clean, safe for re-use.

SELF-CLEANING FILTER TUBES

Self-cleaning filter tubes, washed free of contaminants during brief backwash interval, require no manual cleaning or maintenance . . . provide maximum filtering efficiency at all times.

ECONOMICAL OPERATION-NO PRECOATING OR FILTER AIDS

Practical design provides dependable, trouble-free operation . . . eliminates all need for precoating, filter aids, and expendable filtering media.

Compact multiple filter-tube unit increases production, reduces downtime, extends tool and wheel life, allows better product finishes with fewer rejects.



For "J" Equipment Bulletin showing cut-a-way view and complete operating data.



HONAN-CRANE CORP. 404 MADISOM AVENUE

HOUDAILLE-HERSHEY CORP.



form on both sides and root as shown below





At last, you can burr and chamfer the entire tooth form of both spur and helical gears from 5/8 to 91/2-inches pitch diameter, as well as external straight and involute form splines on the new Universal Burr-Master by Modern.

Patents. Pending



The new BME Universal Model Burr-Masters will solve your gear and spline deburring and chamfering problems at production rates heretofore impossible. Truly the answer to a normally costly gear and spline production operation, Modern's new Universal Burr-Master is . . .

- because it doesn't sacrifice speed for versatility. Operating continuously, the machine deburrs and chamfers more than five teeth per second. A typical 22-tooth gear can be completely finished at a rate of more than 600 per hour, at 80% efficiency.
- Universal. because new models have a capacity range from 5/8 to 61/2-inches pitch diameter and 3 to 91/2-inches pitch diameter for popular pitch gears. Both single and two-station models are offered for additional versatility.
- universal because an unskilled operator can change the precision tooling for a different part in about 10 minutes setup time.
- because it automatically compensates for minor stock variations in production parts. This unique design feature lets you deburr and chamfer gears or splines that are slightly oversize or out-of-round without affecting the operating cycle.
- Universal. because all controls and adjustments are readily accessible when needed. No special tools required in making adjustments or changeover. All models developed for maximum production with minimum downtime.
- universal. because precision form-cutting tools can be removed, sharpened and replaced by an unskilled operator without worry as to gaging or alignment to retain correctness of form. Long tool life, too.

For complete details, write today for Bulletin 103-60



Saving \$1600 a year

on clutches alone



Model MDT Plymouth focomotive pulling a 320-ton steam locomotive to the scrap heap. This 35-ton locomotive is equipped with an Allison TORQMATIC Converter which smoothly transmits power from a 220 h.p. Diesel engine.

In September 1951, Pittsburgh Ferrous Products Company bought a Toromany bought a Toromany Englace one with a mechanical drive. With his old locomotive, this scrap dealer had to replace clutches four times a year—at \$400 each. But with an Allison Toromatic Converter transmitting power in the new unit—a saving is effected of \$1600 a year on clutches alone, plus additional savings in labor and availability.

Since it was delivered, this locomotive has worked more than 4000

hours with absolutely no down time. The small 35-ton unit has pulled loads as high as 1400 tons. With the TORQMATIC Converter smoothly transmitting power, sudden jerks and jolts are eliminated, cutting wear on car couplers, scrap cars and the locomotive itself.

The Fate-Root-Heath Company, makers of Plymouth locomotives, is one of many manufacturers who install Allison Toromatic Drives in their products to help their customers get more work at less cost. For more information on how you

ALLISON TORQMATIC CONVERTER

SIMPLE DESIGN—one-piece cast converter elements—minimum maintenance

COMPACTNESS simplifies installation

DESIGNED for power applications in the 75 to 400 h.p. range

LONGER EQUIPMENT LIFE—absorbs shock, eliminates engine lugging, cuts maintenance costs

can cut your heavy-duty equipment operating costs, ask your equipment dealer, manufacturer or write:

ALLISON DIVISION OF GENERAL MOTORS
Box 894AA, Indianapolis 6, Indiana



Allison toromatic drives



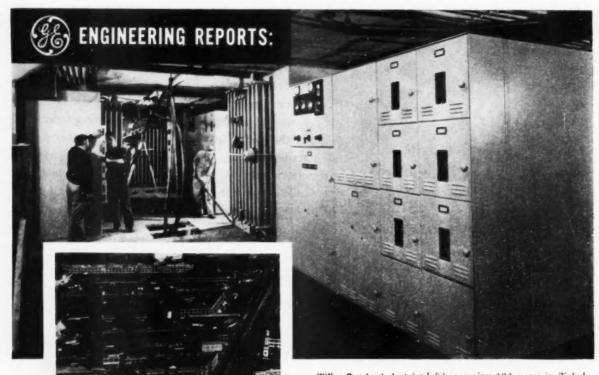






COMPACT, EFFICIENT HYDRAULIC DRIVES FOR CRANES * TRUCKS * TRACTORS * SCRAPERS * SHOVELS * DRILLING RIGS * LOCOMOTIVES

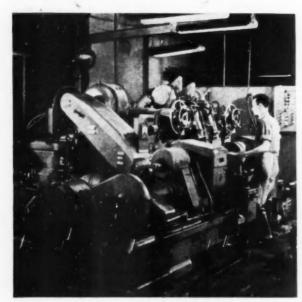




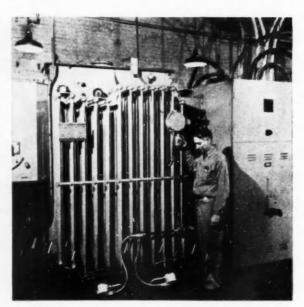
AT WILLYS-OVERLAND-

Willys-Overland plant (at left), covering 103 acres in Toledo, O., adds five new G-E unit substations to expand simply and easily its radial distribution system. Total plant capacity is now 26,000 kva. Three of the 1500-kva subs (above), with two others, furnish power to aircraft landing gear division.

One of nation's first load-center

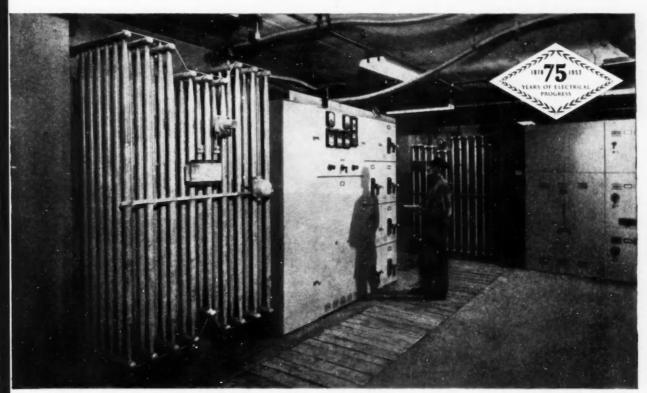


Grinder for Crankshoft pin bearings is powered by a G-E unit substation, 4160-volt to 440-volt, which is located just beyond screen at left, adjacent to the load area.



Instelled since 1945, when original system was expanded, G-E unit substation, with Pyranol* transformer, has been operating 24 hours a day, 5 days a week, with low maintenance cost.

*Reg. Trade-mark of General Electric Co.



New load-center units are added to system which has operated for 13 years without power failure. Addition of new substations, like the two new 1500-kva units above, does not

alter over-all system, provides high degree of flexibility to handle shifts in plant loads. Unit subs, used as building blocks, can be placed wherever needed.

systems: Never a power failure!

G-E radial distribution system, installed in 1939, easily expanded to 26,000 KVA for increased plant loads

Flexibility in reliable power distribution for stepped-up production of Jeeps . . . quick, easy power expansion at little expense . . . low-cost maintenance with maximum safety. The Willys-Overland Company in Toledo found these advantages of its plant's radial distribution system multiplied when five new G-E 1500-kva load-center substations were added recently for greater plant capacity.

During the past 13 years of trouble-free operation, engineers have had first-hand experience with the low cost, simplicity, and reliability of the radial system. A G-E outdoor unit substation furnishes plant power, steps down utility voltage to a usable 4160 volts. Eighteen unit substations handle load requirements in more than two-score buildings on the 103-acre tract.

This installation is just one example of the way G-E engineering helps industry meet demands for more power. For further information, contact your G-E Apparatus Sales representative, or write for GEA-3592. General Electric Company, Schenectady 5, New York.



Outdoor G-E master unit substation, plus an indoor G-E station, furnishes power for 90 per cent of Willys-Overland capacity.

Engineered Electrical Systems for the Automotive Industry





Will he Buy Your Truck Next Time?



IT ALL DEPENDS
ON PERFORMANCE
and
PERFORMANCE
DEPENDS ON

enith
carburetors



No manufacturer could long exist in the competitive commercial vehicle field without drawing heavily on previous owners for new vehicle sales. It is perfectly obvious, no owner would buy the same make vehicle again and again unless it has delivered satisfactory performance. Therefore, it is just good business to see that every component contributes its share toward building owner loyalty. That's why manufacturers whose vehicles are Zenith* equipped measure carburetion costs in lasting terms rather than initial expense. In the field of heavy-duty carburetion, one name, Zenith, has stood for lasting satisfactory performance for over a quarter of a century. Zenith's rugged construction, strong idling, freedom from stalling and response to every demand make it the engineers' choice. For good will, it's good business to specify the best—Zenith for lasting performance.

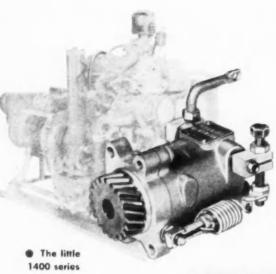
ZENITH CARBURETOR DIVISION OF

696 Hart Avenue . Detroit 14, Michigan

Bendix

AVIATION CORPORATION

Export Sales: Bendix International Division, 205 East 42nd Street, New York 17, N.Y.

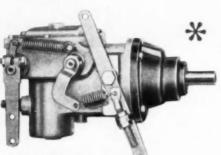




PIERCE GOVERNORS

preferred for gas (LPG), gasoline and diesel industrial engines... big, medium and small

The standard long range 900 series



PIERCE

 The hydraulic booster for extra power on racks and valves Pierce centrifugal governors are your most dependable and efficient control mechanisms for industrial engines . . . from small generator sets to monster power units . . . gas (LPG), gasoline or diesel. For engines requiring extra power to position fuel rack or valve, the Pierce centrifugal with hydraulic booster * (for original equipment only) is ideal! Pierce offers a ready solution to most engine governing problems . . . send full details and specifications on your particular problem. Complete engineering service available.

THE PIERCE GOVERNOR CO., INC. 1602 OHIO AVENUE, ANDERSON, INDIANA

"World's Most Experienced Governor Manufacturer"

OHydraulic Cylinders by Mullins Koldflo* Process are less expensive and better...

NO Machining! Grinding: Honing! NO Welding! Heat Treating!

ROUNDNESS to within 0.001"

STRAIGHTNESS to within 0.002"

CONCENTRICITY to within 0.005" total

SMOOTHNESS-no "O"-ring wear

Koldflo Cylinders have NO TAPER and are made up to 42" long
... and with integral bottoms

Hydraulic cylinders are made by the Mullins Steel KOLDFLO* Process in *one piece*, coming from the presses with smoothness, hardness, strength and precision never before achieved.

This process eliminates costly 3-piece construction and substantially cuts production costs.

Koldflo

HYDRAULIC

CYLINDERS

BULLETIN NO-2

In addition, hydraulic accumulators made by the KOLDFLO Process lose less pressure in performance tests. Less pressure is lost because of the better "O"-ring seal characteristics of the surface of hydraulic accumulators produced by this method.

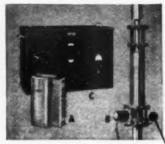
If you're tired of 3-piece tubing and casting cylinders; if you want a round, straight hole with no taper; if you want BETTER CYLINDERS, write for your copy, Hydraulic Cylinders, Bulletin No. 2, today.

Koldflo Division

MULLINS MANUFACTURING CORPORATION SALEM, OHIO

*Kolofio is a trademark of the Mullins Manufacturing Corporation

Increase the use of your Baldwin Testing machines with these accessories



High Temperature Testing Equipment

Includes electric furnace (A), high temperafure extensometer (B), and temperature controller (C) which enable you to test metals at high temperatures. Various models are available for temperatures up to and including 2200° F.



Extension Under Load Indicator

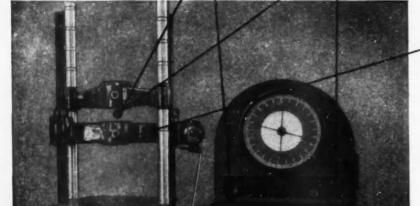
Used with a microformer type extensometer, this indicator will give you both a visual and audible signal at any desired predetermined amount of extension under load (such as 5% of the gage length).

SR-4 Extensemeter and Strain Gage Recorder

This records on a chart a load-elongation graph for determining the elastic and plastic properties of materials. Various types are available.







BULLETIN 261-A, a 12 page booklet, illustrates and describes fully Baldwin's line of grips, accesseries and auxiliary equipment. Write Dept. 2304, Baldwin-Lima-Hamilton Corporation, Philadelphia 42, Pennsylvania.



Air Cell (with Bourdon tube-type indicators)

Inserted in the grip slot and arranged to work with the testing machine indicator or a portable indicator, the Air Cell extends the precision ranges down to one pound full scale on any machine. This permits testing of light materials such as plastics, textiles, wood, foils, fibers, etc. with machines intended for higher capacities. (Bulletin 264.)



Strain Rate Pacer

(Shown with Microformer Recorder.) This device enables you to maintain percisely a constant straining rate of the test specimen gage length during the loading of the test specimen. Standard pacing speeds from .00025 to .25 inch per minute are available.

Ram Pater

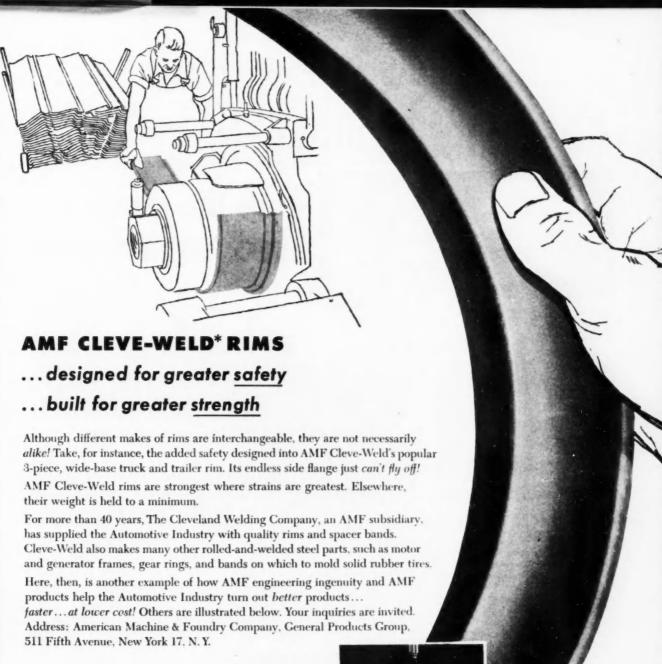
This controls ram speed at desired rate (8 pacing speeds, from 0.01 to 1.0 inch per minute). Enables you to meet test specifications. High magnification types for infinitely variable speeds from 0.002 to 4.0 inches per minute also available.



TESTING HEADQUARTERS

BALDWIN-LIMA-HAMILTON

Philadelphia 42, Pa. • Offices in Principal Cities





ASSEMBLY 15 SPEEDED by AMF's Thompson-Bremer *Everlock** self-locking nuts, tooth-type lock washers and SEMS.



SHIPPING AND MAINTENANCE departments find AMF De Walt* Power Saws save time in all woodcutting operations.



AMF WAHLSTROM* Fully-Automatic Chucks and AMF FLOAT-LOCK Instant-Change Safety Vises speed tool set-up changes.



AMF INDUSTRIAL LOWERATOR*
DISPENSERS store and position
planned quantities of parts in
process at efficient working levels.

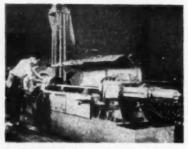


U·S·S Carilloy steel cushions bone-rattling jolts



on the world's finest medium tank

Here are the Carilloy steel torsion bars ready for shipment. Torsion bars are used on the Patton 48, and others, so that the tanks can be built closer to the ground, giving a lower silhouette.



On this twister at the Cicero plant of Maremont Automotive Products. Inc., the finished Carilloy steel torsion bars are prestressed before shipment to the tank manufacturer.



THE army's amazing new Patton 48 not only moves faster, shoots straighter, and offers better protection to the tank crew, than World War II models, but it has a vastly improved suspension system that features torsion bar springs made of U-S-S CARILLOY steel. As a result, it rides lower, more level, and with less jarring.

During rugged field tests, this 45-50ton tank rolls along at more than 30 miles an hour, knocks down telephone poles and houses, rumbles over deep trenches and scales 3-foot walls. All the while, the Carllloy steel torsion bars that support the driving wheels flex, twist, and vibrate. They smoothly absorb most of the jolts.

Torsion bars withstand this heavy pounding . . . and do a better job of cushioning these shocks than previous spring systems. What's more they take less space, so the tank can be built closer to the ground and has a lower silhouette.

U.S.S Carilloy 8660 is a Ni-Cr-Mo electric furnace steel which possesses the hardenability needed in these torsion bars. It will produce a minimum hardness of 55 Rockwell "C" at %6" from the quenched end in the standard End Quench hardenability test. It has excep-

tionally good surface and sub-surface qualities.

Both the U.S. Army Ordnance Corps and the spring manufacturer, Maremont Automotive Products, Inc., are well satisfied with this excellent performance.

U·S·S Carilloy steels are doing many tough jobs like this on both military and civilian products. No matter what steel problem you have, we have probably met and licked one like it before. We can help you solve yours. Just contact our nearest District Office, or write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

UNITED STATES STEEL CORPORATION, PITTSBURGH . COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO

TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. . UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS

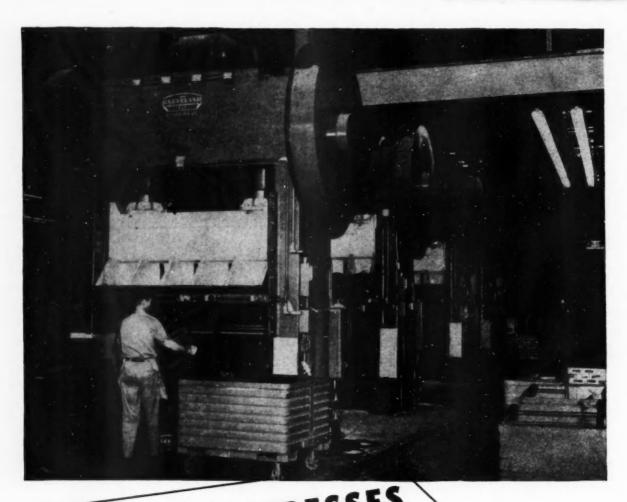
MITED STATES STEEL EXPORT COMPANY, NEW YORK

Carilloy Steels

3-1814-A

II NITED CTATES STEEL





FORM RANGE TOPS FOR GENERAL ELECTRIC

These 8 new Cleveland Presses, are now in operation at Appliance Park, Louisville, Kentucky, General Electric's new appliance center, producing parts for famous General Electric ranges.

We're proud that Clevelands were chosen for this new press battery. Their selection resulted from General Electric's constant search for increased efficiency through improved equipment and methods. All of these presses are equipped with the Cleveland (patented) Drum Type Clutch.

If you, too, need greater press efficiency, you can't afford to overlook the economies and production advantages offered by Cleveland Presses. They are made in a complete range of types, sizes and capacities, so you can be sure of getting the exact press for your particular requirements. Why not call a Cleveland representative? He'll gladly study your needs and after consulting with our engineers, he'll give you figures that we're sure you'll find interesting.

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THE CLEVELAND PUNCH & SHEAR WORKS COMPANY

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Apex extensions provide the extra length that makes it easy to drive screws in hard-to-reach places.

You can use them on any air, electric or spiral driver that accommodates 1/4"-24 screw shank.

You can use them with any Apex 1/4"-24 power bit or bit holder and insert bits.

You can use them in driving Phillips, Frearson (Reed & Prince), Slotted, Clutch Head, Socket Head (Allen type) or Hex Head screws.

In short, you can get the answer to just about any screwdriving problem from Apex. Write, on your company letterhead please, for your copy of our new Catalog 21—the authority on screwdriving.



to drive PHILLIPS or FREARSON screws



to drive SLOTTED screws



to drive CLUTCH HEAD screws



to drive HEX HEAD screws



...with APEX bit holder and insert bits



power bits, bit holders and insert bits

THE APEX MACHINE & TOOL COMPANY
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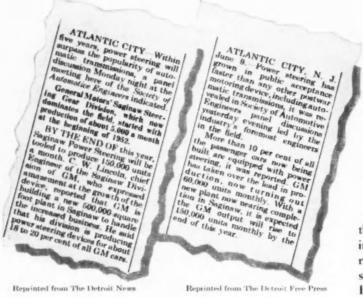
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SAGINAW LEADS RECORD-BREAK SWING TO POWER STE

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The demand for Saginaw Power Steering is growing so rapidly

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SAGINAW STEERING GEAR DIVISION, GENERAL MOTORS CORPORATION, SAGINAW, MICHIGAN



chrome plated oil rings

Augus CSR-200 feet broket new annielle place rives the advantage of Groupe plating and Unition—half the root of the ne pintal god has all

luces any view, cost west and frictions And the ambring the potent "Unitating" process; blushings in delicate the control piece content together with special adhed the which the two completely during the families run, leaving the places experient and free to evaluate, the piece is contained. Use it a your resembly the life of particular, the life of the piece is







Multiple pieces handle like a one-piece ring. Rails and spacer are correctly assembled and "Unitized" with adhesive cement.



Adhesive disappears during first engine run. Pieces separate to conform to cylinder contours.



Heavy duty expander assures perfect fit. Tight seal conserves oil, increases engine efficiency.



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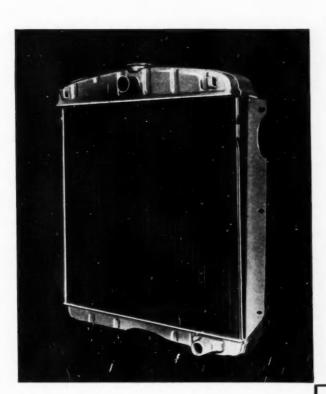
General Offices: Youngstown, Ohio - Export Office: 500 Fifth Avenue, New York 36, N. Y. PIPE AND TUBULAR PRODUCTS - CONDUIT - BARS - RODS - COLD FINISHED CARBON AND ALLOY BARS - SHEETS - PLATES - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RAILROAD TRACK SPIKES

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Every Harrison radiator is designed to perform a specific cooling job . . . and before it is finally approved for production, it must pass exhaustive tests as an integral part of the complete cooling system.

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GENERAL MOTORS CORPORATION LOCKPORT, NEW YORK

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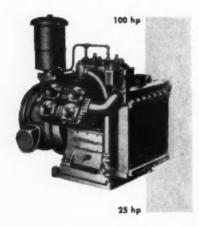
from 1/2 to 100 hp

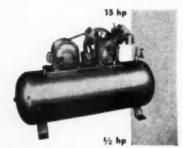
I-R AIR-COOLED COMPRESSORS

give you these important advantages



This 50-horsepower V-belt driven Type 40 compressor supplies air in an abrasive-manufacturing plant.





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- . NO SPECIAL FOUNDATION
 - . EASY MOVABILITY

. NO COOLING WATER REQUIRED

- . NO WATER PIPING
 - . NO DANGER OF FREEZING
- Wherever compactness and light weight, low installation and operating costs, dependable service, and minimum attendance are important factors, Ingersoll-Rand air-cooled compressors fill all the requirements.

Their wide acceptance by all types of industry-from mines to power plants-from drug manufacturers to cargo ships-proves their versatility and dependability. For main air supply, for supplementing the capacity of larger compressors or for de-centralized air systems, Type 30 and Type 40 compressors are ideal. Your nearest I-R representative will be happy to apply his knowledge and experience to your particular problem.

Type 40 Compressors are two-stage, air-cooled . . . sizes from 25 to 100 hp. Discharge pressures from 80 to 125 psi, also up to 200 psi. . . . Three types of drive: "Motor-compressor," with built-in electric motor; flexible coupled; or V-belt driven. Durable, efficient Channel Valves, Timken tapered-roller main bearings and Constant-level lubrication are additional features. Dual-Control permits selection of constant speed or automatic-start-and-stop control.

Type 30 Compressors come in sizes from ½ to 15 hp... handle smaller volumes of air at pressures from 5 to 3500 psi. Available as complete receiver mounted units, with base-plate mountings, or as bare compressor units. Can be equipped with automatic-start-and-stop control, constant-speed control, or dual-control to permit selection of either type. For special service such as instrument control or agitation, certain sizes are available with non-lubricated cylinders.

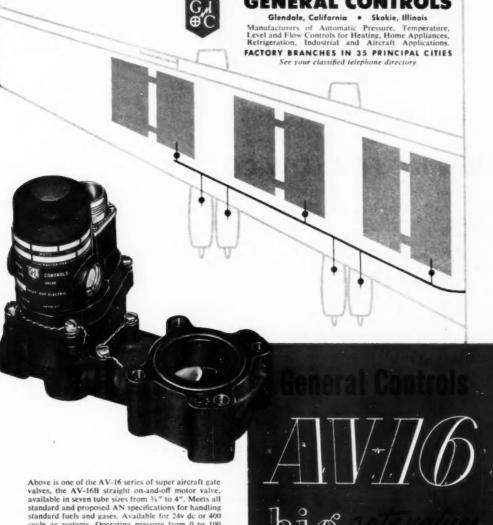
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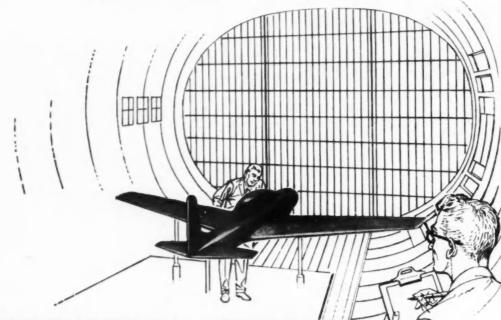
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standard fuels and gases. Available for 24v dc or 400 cycle ac systems. Operating pressure from 0 to 100 psi. Clutch limit control permits use of conventional motor with exact "on-off" positioning. Valve movement can be instantly reversed at mid-point.

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DESIGNING FOR LOW COST

TEMCO's expanding engineering staff approaches the complex problems of military aircraft design with thorough cost-consciousness...cost-consciousness toward original production, as well as operation and maintenance. TEMCO design is guided by the company philosophy to "build a quality product...on schedule...at the lowest possible cost." A good example of this creative foresight is a current TEMCO trainer design. It has wingtip extensions that make it possible for the trainer to be used in two stages of training instead of one.

Already recognized for its record low-cost production, TEMCO Aircraft Corporation is building for the future with cost-conscious design.



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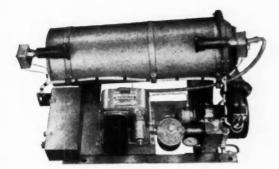
DALLAS

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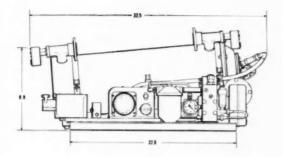
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JANITROL SIMPLIFIED LIQUID HEATER

to give all of these:



111



Condensed Specifications

operation	dieser on, gasotine, or jet tuer
weight	80 lbs
output rating	90,000 Btu/hr
fuel input (continuous operation) less than 1 gal/hr at rated output
fuel pressure	30-32 psi
power requirement	5-61/2 amp at 24 volt dc
stack temperature rise	650 to 750° F
coolant circulation (calculations 30° F rise)	Water-5 gal/min thylene Glycol (60/40)-9.6 gal/min

dependability

Thousands of military vehicles have proved that Janitrols do the job. "U.R.s" are virtually non-existent—proof of field dependability. "One shot" acceptance on installation qualification tests... Janitrol liquid heaters passed every one the first time... further proof of Janitrol manufacturing dependability.

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Design for present or projected vehicles is simplified. Closed system of 1" tubing is easier to install, affords greater flexibility, saves space. Heater uses vehicle fuel—gasoline, diesel or jet fuel. Applications include fuel preheating, cab, cargo and engine pre-heating, defrosting, and maintenance of correct diesel engine operating temperature.

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Extra heat transfer area, coolant container walls exposed to radiant and convected heat. Sealed in whirling flame combustion chamber plus counter-flow coolant travel result in top heat transfer efficiency.

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"Demand" operation (fully automatic cycling) conserves fuel, means longer heater life. 90,000 Btu/hr output, maximum (continuous full capacity operation) fuel consumption less than one gal/hr.

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Interchangeable "plug-in" components speed inspection and servicing. All units, except combustion chamber, accessible for servicing without removing heater.

PLUS SERVICE & SAFETY PROVEN WORLD-WIDE

Janitrol *Liquid* Heater service is proved, not just in a laboratory, but on thousands of military and commercial vehicles in the field, all over the world.

Janitrol Liquid Heaters exceed all trade and military specifications for safety! Automatic blower overrun purges heater after each shutdown. Dual contact, fully radio shielded, high tension ignition system is completely hazard free, unaffected by extremes of weather or altitude.

Janitrol's wealth of vehicle heating knowledge, the culmination of over 36 years combustion engineering experience, is at your command through our nearby field representative.

HEAT WHEREVER YOU WANT IT

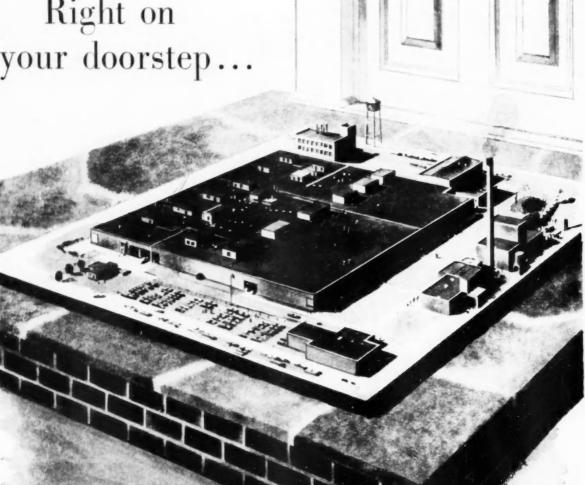




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FOREIGN AGENTS IN PRINCIPAL COUNTRIES OF THE WORLD

DISSTON STEELS

This story is somewhat different

maker and a toolmaker. In its extensive mills the company produces many kinds of high-grade special steels—for use by other leading toolmakers, as well as for its own famous saws and tools. Throughout industry, the phrase "Made from Disston Steel" is recognized as a guide to the very highest quality.

Hot rolled, carbon, and alloy steels—including water-, oil-, and air-hardening die steels, and high speed steels.

Special shapes and composite steels.

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731 Tacony, Philadelphia 35, Pa., U.S.A.



Who ever heard of machining scrap? Sounds silly on the face of it-yet countless companies admit wasting money in just this way every day: Spending hours machining and finishing parts from initially defective material-only to have them scrapped at final inspection; tying up production machines - squandering man-hours to no avail!

All this happens because of invisible cracks and defects which go undetected through stage after stage of processing, right to the end of the line!

What a needless waste! Because, with the fast,

non-destructive inspection methods developed by Magnaflux Corporation you can know in advance which parts or materials are defective...can unerringly separate the defectives when it costs least to salvage them or scrap them...and correct the process that causes the defect.

This is "correctioneering," by Magnaflux' methods! It is now a basic part of process control in hundreds of notably efficient plants. Write us and we'll show you how they use it . . . how

it may save you money!

PROCESS CONTROL-through Methods by Magnaflux-FINDS THE "HOW AND WHERE" OF LOWER PRODUCTION COSTS



Detects defective parts or materials at a point where it costs least to reject them.

Reveals operating trouble in processes or tools at first occurrence, so they can be corrected.

Insures quality that is acceptable, at lowest cost per piece.

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SANBORN OSCILLOGRAPH RECORDING
SYSTEMS HAVE MANY APPLICATIONS

Sanborn Recorders Help Speed Flight Design



At McDONNELL AIRCRAFT CORPORATION the movements of a guided missile are simulated by high-precision analog computers which in turn send eight different resultant electric signals into two Sanborn four-channel Recording Systems (left) for the graphic recording of the hypothetical results of the guided missile problem.

How can Sanborn help you?

Sanborn one-, two-, and four-channel Recording Systems can provide an accurate and permanent graphic registration of almost any electrical phenomena whose frequency spectrum falls within the range of zero to 100 cycles per second. The availability and ready *interchangeability* of amplifiers and preamplifiers offer a wide range of use.

Records are traced by heated stylus on plastic coated strip-chart paper, and are in true rectangular coordinates. Other Sanborn advantages include: a high torque movement (200,000 dyne cms per cm deflection); built-in code and time markers; and a wide choice of paper speeds and channels.

Sanborn engineers will be pleased to make recommendations as to what type of equipment will best solve your recording problem. When writing, include the lower and upper limits and the frequency range of the phenomena to be recorded, and the type of transducer.



SPERRY GYROSCOPE COMPANY

uses a two-channel Sanborn Recording
System for basic research on their
Zero Reader* Flight Director, a device
which simplifies the manual
control of aircraft. The Sanborn System
shown above is recording the output
of a flight simulator that solves Zero
Reader equations.

T. M. REG. U. S. PAT. OFF.







At DOUGLAS AIRCRAFT

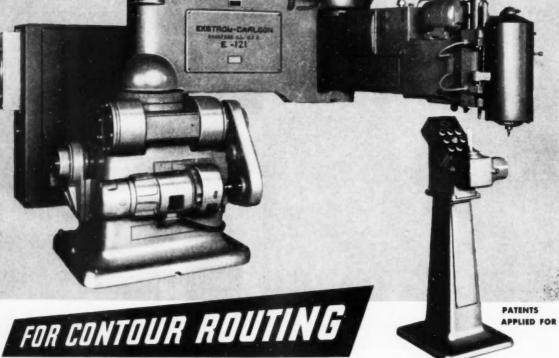
COMPANY'S Flight Test Section, a Sanborn two-channel Recording System (shown removed from case for field operation) is used in conjunction with a telemeter radio link to record surface motion vibration in a flying aircraft while it is performing tests requiring continual monitoring. Recorded tracings provide the necessary permanent visual time history for comparison of the two events recorded and a study of their individual characteristics.



Ask for a copy of our "Applicability Folder" which presents a table of uses, complete performance data and specifications, brief descriptions of Sanborn Recording Systems and explanations of how their amplifiers may be readily interchanged.

SANBORN CO. INDUSTRIAL DIVISION CAMBRIDGE 39, MASSACHUSETTS

A MARVEL OF SPEED AND POWER!

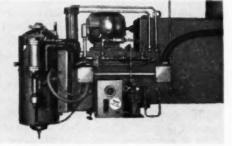


EKSTROM, CARLSON E-121

Contour Routing and Milling Machine Here is the newest, most advanced machine for contour routing and milling of aluminum slabs or stacks of sheets up to 2" thick—easier and faster than it has ever been done before! The EKSTROM, CARLSON E-121 shown above is an all-electric machine with a simple joy-stick controlling both direction and rate of feed. Now, with a minimum of effort, an easily-trained operator, working at a remote control station, can follow complex templates, do inside or outside routing, control depth of cut accurately, change over quickly from one job to another, break production records, and reduce costs. Write today for literature giving complete details.

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by EKSTROM, CARLSON



WHY IT PAYS TO BUY STEEL FROM WAREHOUSE



You don't waste productive space storing steel!

WHEN YOU BUY STEEL FROM WAREHOUSE, YOU GET:

- . LOWER INVENTORY COSTS
- . LOWER SPACE COSTS
- . LOWER TIME COSTS
- . LOWER CAPITAL INVESTMENT
- . FASTER PRODUCTION
- FEWER INVENTORY LOSSES

You can turn your present steel storage space into profitable production space—without danger to the continuity of your steel supply. Just use a U. S. Steel Supply warehouse as your own. U. S. Steel Supply can deliver the steel you want to your plant or job site at whatever time you desire. Ask your U. S. Steel Supply salesman to arrange delivery of your steel at your convenience—and you'll find your steel arriving with timetable dependability.

U. S. STEEL SUPPLY

DIVISION

General Office
208 So. La Salle St., Chicago 4, III.



Warehouses and Sales Offices Coast to Coast



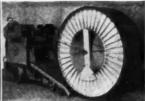
Die Handler



Pallet Retriever



Hander



Cable Reel Handler



Side Dump Revolving Unit



Roll Handler with Apron



Tin Plate Clamp



Bale Clamp



Twin Coil Handler



Rotary Scoop



Roll Piercing Truck



3-Ton Low Lift; 1-Ton Crane



Rell Clame

ELWELL-PARKER trucks for every type of handling



Special Crane

Only a FEW examples of Elwell-Parker's ingenuity and enterprise in meeting unusual materials handling requirements are shown . . . Not infrequently, the peculiar shape or nature of a load makes a standard truck impractical. In producing attachments or units for such needs, Elwell-Parker draws on its 45 years of experience supplying power trucks for over 300 industries . . . From its line of 87 different sizes and types, Elwell-Parker can usually select a standard truck for the job. If not, ask your E-P man about a unit precisely suited to your needs. The

Elwell-Parker Electric Co., 4118 St. Clair Avenue, Cleveland 3, Ohio.



Carton and Drum Handler



NEW ATTACHMENT FOLDER describes and illustrates in detail the many attachments for E-P fork trucks. Write for your copy.

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Established 1893.

A Report from Vanadium Corporation

How Vanadium Corporation's long-range expansion program is helping industry.

CHROMIUM ALLOYS

Vanadium Corporation's new plant at Graham, West Virginia, has been especially equipped to produce—by a unique new process—a remarkably clean, dense new *low carbon ferrochromium*. This new alloy combines a normal silicon content with a high chromium-to-carbon ratio which enables the steelmaker to produce stainless steels of extremely low carbon content without resorting to modification of furnace and melting practices.

The new Graham plant also produces various alloys of <u>ferrochrome-silicon</u>. Additional modern facilities at Niagara Falls are producing increased quantities of <u>high-carbon ferrochromium</u> by Vanadium's exclusive process. There is an ever growing demand for these clean, high-density Vancoram Alloys—particularly in the many applications where quality and economy are primary considerations.

GRAINAL ALLOYS

These are the multiple-element alloys developed by Vanadium Corporation that are now being used to produce annually over a million tons of boron steels. Replacing critical and more costly elements with respect to hardenability and other properties, Grainal Alloys have proved invaluable not only in times of heavy defense production but also in providing low-cost, high-quality alloy steels for our peace-time economy.

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Anticipating the future demand for Grainal Alloys, Vanadium Corporation has included at its new plant at Cambridge, Ohio, additional facilities for their production.

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With government restrictions on the use of vanadium now lifted, steelmakers can once again take full advantage of Vancoram ferrovanadium. Small additions of this versatile, economical alloy often do the work of large amounts of other, more expensive alloys—a little goes a long way.

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For example . . .

New VCA mines in Colorado have substantially increased the production of *vanadium ore* in conjunction with western uranium operations.

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RESEARCH

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covering the issues from January 1 to June 15, 1953, inclusive

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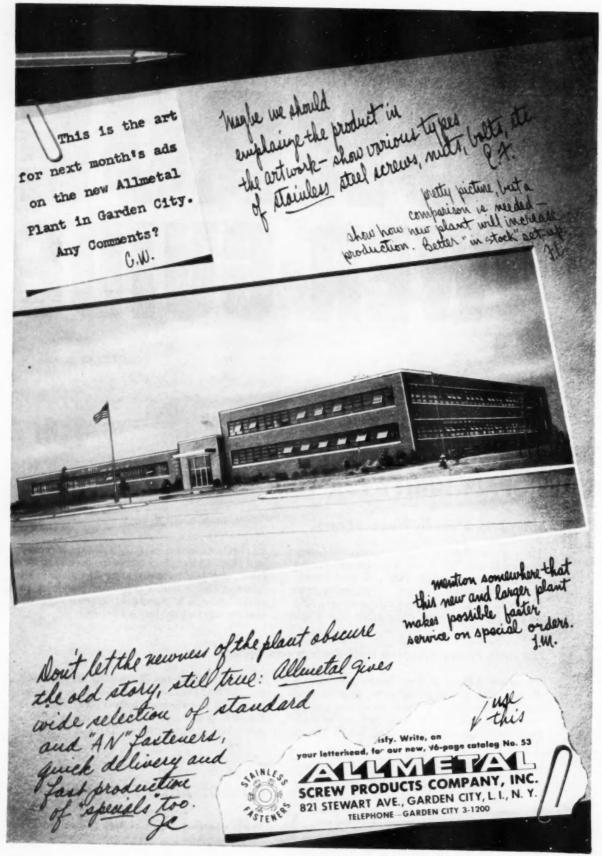
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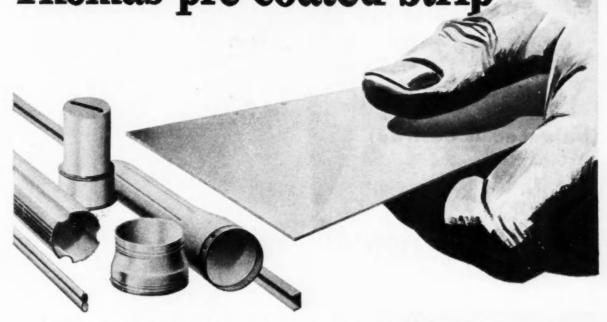
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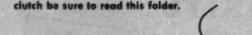
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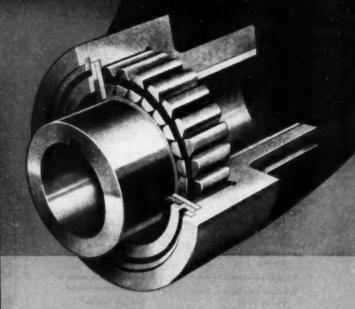
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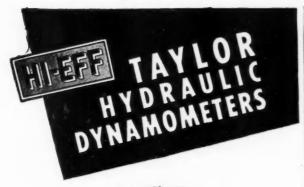
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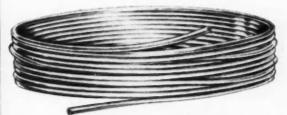
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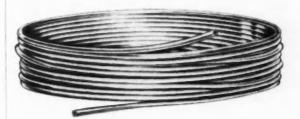
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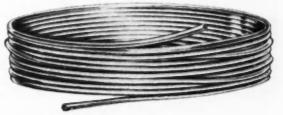


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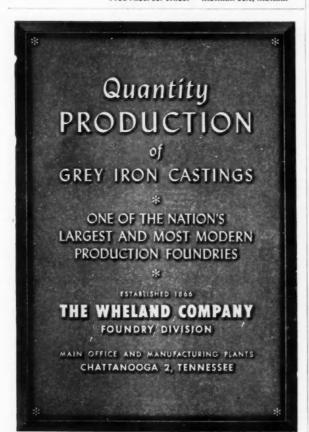


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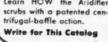
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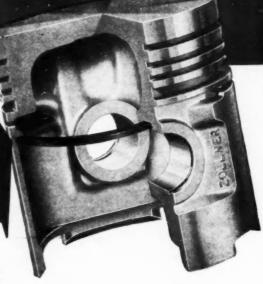
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